



PageWriter  touch

SERVICE MANUAL

PHILIPS

Notice

About This Edition

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electrosurgical equipment and close
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Like all electronic devices, this
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occurs when electrostatic energy is
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electrodes, or the cardiograph.
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THIS PRODUCT IS NOT
INTENDED FOR HOME USE.

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The PageWriterTouch cardiograph
complies with the requirements of
the Medical Device Directive
93/42/EEC and carries the  0123
mark accordingly.

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Introduction

This Service manual provides the information needed to successfully service the PageWriterTouch cardiograph and cart system (Philips part number 860284). This manual provides you with information on troubleshooting, repairing, and performance verification and safety testing of the cardiograph and cart system. There is also information on the theory of operation, maintenance procedures, and ordering parts and supplies.

In this chapter, you will find general information that you should know before servicing the PageWriterTouch cardiograph. For detailed information regarding controls, operation, and capabilities of the device, refer to the *PageWriterTouch Cardiograph Instructions for Use* shipped with the product.

You must review the *PageWriterTouch Cardiograph Instructions for Use* before servicing this device. This Service manual assumes you are familiar with the controls and with basic cardiograph operations.

This chapter is organized into the following sections:

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Who Should Use this Manual

The intended users of this manual are technical personnel trained in the safe and proper servicing of the PageWriterTouch cardiograph.

Before attempting to service the cardiograph, you must review the following documentation and training materials provided on CDs shipped with the product:

- *PageWriterTouch Cardiograph Instructions for Use*
- *PageWriterTouch Cardiograph Interactive Training Program*
- *PageWriterTouch Service Training*
- This Service manual, including the test questionnaire found at the end of the book

Conventions Used in this Guide

The documentation and training materials use the following typographic conventions.

Item	How Displayed
Menu item Button name	Menu items and button names appear in a bold no-serif font. <i>Example:</i> Touch Config .
Keyboard keys	Keyboard keys, such as Enter, or Tab, appear in italic font. <i>Example:</i> Press <i>Enter</i> after typing the name.

WARNING Warning statements describe conditions or actions that may result in personal injury or loss life.

CAUTION Caution statements describe conditions or actions that may result in damage to equipment or software.

NOTE Notes provide additional important information about a topic.

TIP Tips provide suggestions for alternative ways of performing tasks.

Important Patient and Safety Information

The PageWriterTouch cardiograph isolates all connections to the patient from electrical ground and all other conductive circuits in the cardiograph. This reduces the possibility of hazardous currents passing from the cardiograph through the patient's heart to ground.

WARNING Failure to follow these warnings could affect both patient and operator safety.

- When operating the cardiograph on AC power, ensure that the cardiograph and all other electrical equipment connected to or near the patient are effectively grounded.
- Use only grounded power cords (three-wire power cords with grounded plugs) and grounded electrical outlets. **Never** adapt a grounded plug to fit an ungrounded outlet by removing the ground prong or ground clip. If an ungrounded plug adapter is required, use a ground strap to connect the equipotential port (rear of the cardiograph) to the power source ground. Use the equipotential port when redundant earth ground is necessary according to IEC 60601-1.
- If a safe ground connection is not ensured, operate the cardiograph on battery power only.
- The use of equipment that applies high frequency voltages to the patient (including electrosurgical equipment and some respiration transducers) is not supported and may produce undesired results.

WARNING Do not touch accessible connector pins and the patient simultaneously.

Electrical shock hazard. Keep cardiograph, Patient Interface Module (PIM) and all cardiograph accessories away from liquids. Do not immerse cardiograph, PIM, or other accessories in any liquids.

- Periodically inspect the patient data cable, lead wires, and AC power cord for any worn or cracked insulation.
- Keep the patient data cable away from power cords and any other electrical equipment. Failure to do so can result in AC power line frequency interference on the ECG trace.
- The Philips Medical Systems patient data cable (supplied with the cardiograph) is an integral part of the cardiograph safety features. Use of any other patient data cable may compromise defibrillation protection and degrade cardiograph performance.
- Only qualified personnel may service the cardiograph or may open the cardiograph housing to access internal cardiograph components. Do not open any covers on the cardiograph. All internal components must be serviced by qualified personnel.
- Do not use this cardiograph near flammable anesthetics. It is not intended for use in explosive environments or in operating rooms.
- The use of the analog ECG output signal port (not supported on cardiograph) should not be used when critical synchronization timing is required.

- Do not touch the patient, patient data cable, or cardiograph during defibrillation. Death or injury may occur from the electrical shock delivered by the defibrillator.
- Ensure that the electrodes or lead wires do not come in contact with any other conductive materials (including earth-grounded materials) especially when connecting or disconnecting electrodes to or from a patient.
- Connecting multiple cardiographs to the same patient may pose a safety hazard due to the summation of leakage currents. Any combination of instruments should be evaluated by local safety personnel before being put into service.
- Do not pull on the paper while an ECG report is being printed. This can cause distortion of the waveform and can lead to potential misdiagnosis.
- Do not connect any equipment to the cardiograph RS-232 port that does not meet medical safety requirements and that has not been evaluated by local safety personnel.
- Equipment connected to the cardiograph RS-232 port can cause ground leakage currents exceeding the maximum specified in IEC 60601-1 safety standards.
- Do not connect any equipment to the cardiograph RS-232 port if a patient is connected to the cardiograph.
- Only use the Philips Medical Systems AC power cord supplied with the cardiograph. Periodically inspect the AC power cord and AC power connector to ensure that both are in a safe and operable condition. If the AC power cord or AC power connector is not in a safe or operable condition, operate the cardiograph on battery power and contact Philips Medical Systems for service.
- The cardiograph has been safety tested with the recommended accessories, peripherals, and leads, and no hazard was found when the cardiograph is operated with cardiac pacemakers or other stimulators.
- Do not connect any equipment or accessories to the cardiograph that are not approved by Philips Medical Systems or that are not IEC 60601-1 approved. The operation or use of non-approved equipment or accessories with the cardiograph is not tested or supported, and cardiograph operation and safety are not guaranteed.

WARNING

When using additional peripheral equipment powered from an electrical source other than the cardiograph, the combination is considered to be a medical system. It is the responsibility of the operator to comply with IEC 60601-1-1 and test the medical system according to the requirements. For additional information contact Philips Medical Systems.

Do not use non-medical peripherals within 6 feet of a patient unless the non-medical peripherals receive power from the cardiograph or from an isolation transformer that meets medical safety standards.

- Only install Philips Medical Systems software on the cardiograph. The installation or use of software not approved by Philips Medical Systems is strictly prohibited and cardiograph safety and performance are not guaranteed.

- Only use Philips Medical Systems replacement parts and supplies with the cardiograph. The use of non-approved replacement parts and supplies with the cardiograph is strictly prohibited. Cardiograph safety and performance are not guaranteed when non-approved replacement parts and supplies are used with the cardiograph.
- Manual measurements of ECG intervals and magnitudes should be performed on printed ECG reports only. Do not make manual measurements of ECG intervals and magnitudes on the touch screen display since these ECG representations are scaled.
- Only use patient electrodes that are approved by Philips Medical Systems. The use of non-approved patient electrodes may degrade cardiograph performance.
- The Philips Medical Systems warranty is applicable only if you use Philips Medical Systems approved accessories and replacement parts.

Features and Capabilities

The PageWriterTouch cardiograph is one of the most advanced cardiographs. It offers touch screen operation and numerous additional features making it ideal for high-volume environments. The PageWriterTouch cardiograph is also well suited for hospitals requiring speed and accuracy to process large volumes of ECGs daily.

The PageWriterTouch cardiograph consists of an electrocardiograph with remote digital patient module and optional cart.

Features

The features of the PageWriterTouch cardiograph include:

- Battery or AC operated
- Remote digital acquisition module with replaceable patient leads. Capability for up to 12 leads
- 15-inch color liquid crystal touch screen display
- Graphical representation of a human torso displaying leads that are not connected
- Data to ECG Management system in XML format via modem, LAN, WLAN, or floppy disk
- Optional cart with convenient storage areas for supplies

Capabilities

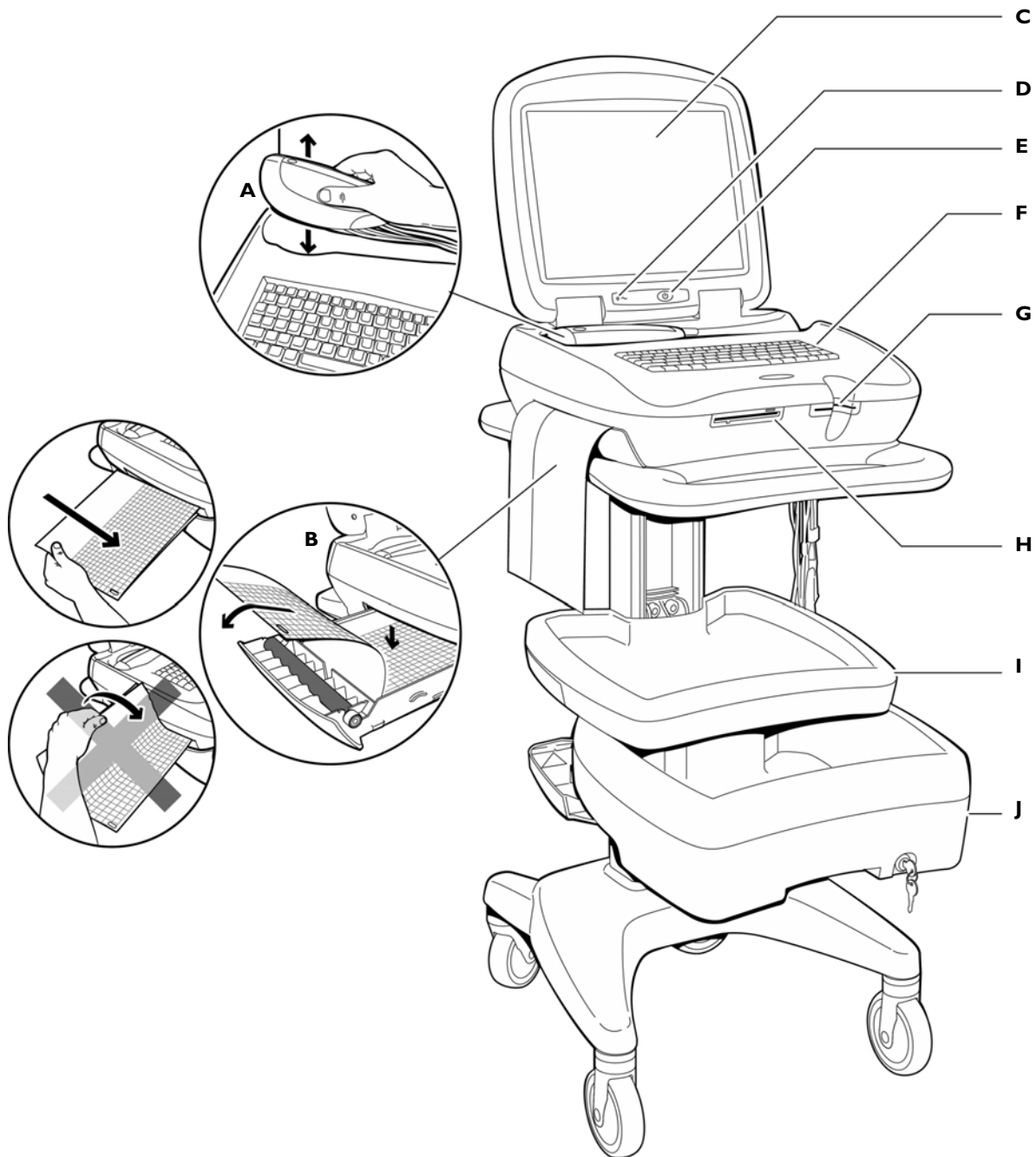
- Downloads patient data from HIS with a floppy disk, barcode, or magnetic card swipe
- Stores ECGs via 3.5-inch floppy disk or PC Card
- Transmits ECGs by FAX, programmable modem, LAN, or WLAN

PageWriterTouch Cardiograph Components

The following sections clearly illustrate the components and connection ports on your cardiograph, as well as the Patient Interface Module (PIM).

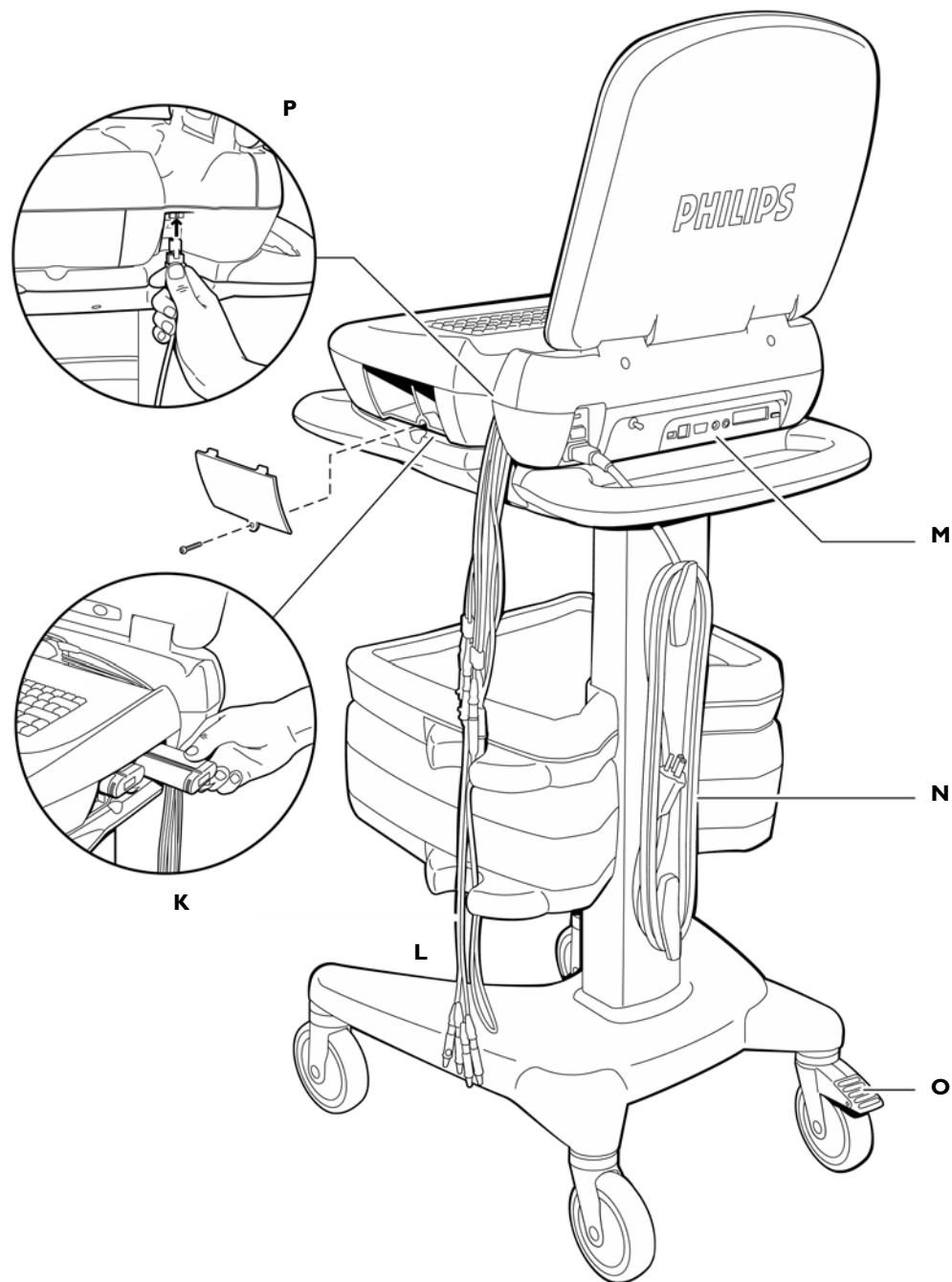
Cardiograph Components

Figures 1-1, 1-2, and 1-3 on the following pages show front, side, and rear views of the PageWriterTouch cardiograph. For additional details, see the *PageWriterTouch Cardiograph Instructions for Use*.

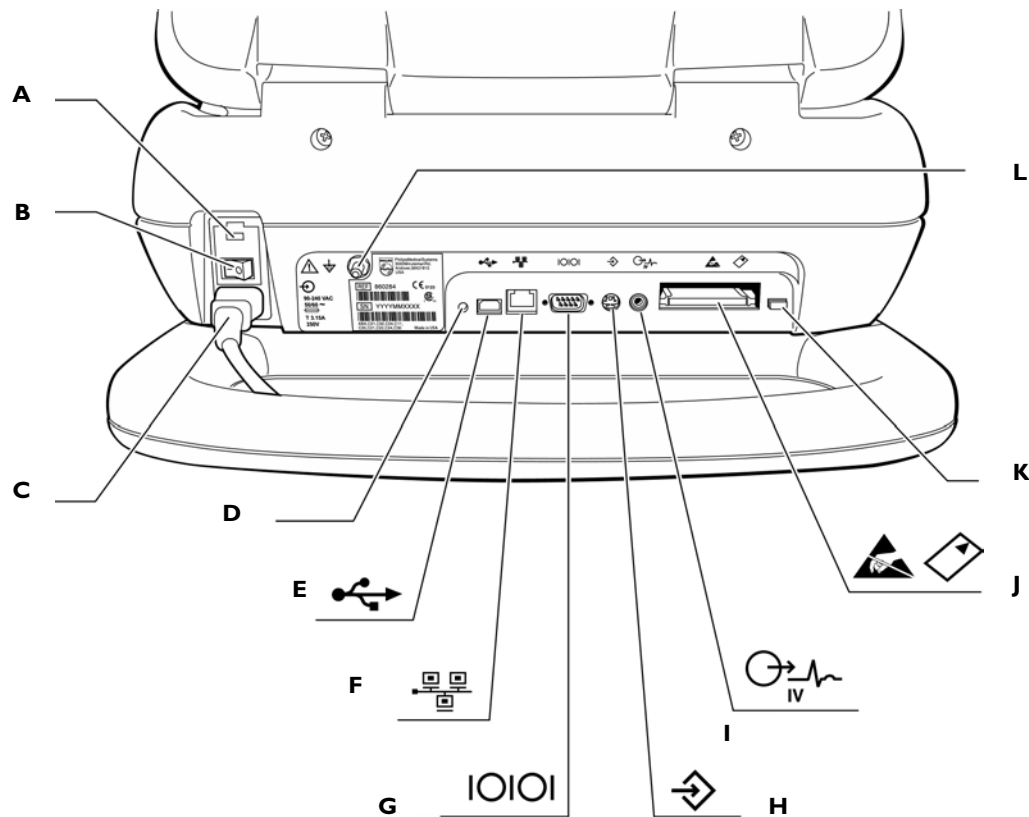
Figure 1-1 Cardiograph and Cart (Front View)

- A** Patient Interface Module (PIM)
- B** Printer/paper drawer
- C** Touch screen
- D** AC Power On indicator light
- E** On/Standby button

- F** Keyboard
- G** Magnetic card reader (optional)
- H** Floppy disk drive
- I** Storage shelf
- J** Locking drawer, optional

Figure 1-2 Cardiograph and Cart (Rear View)**K** Battery compartment**L** Patient Interface Module (PIM) leads**M** Rear panel**N** AC power cord**O** Wheel lock**P** RJ-11 receptacle, for connecting the PIM

WARNINGS Do not connect the LAN cable connector to the PIM RJ-11 receptacle.
Do not plug a telephone connector into the PIM RJ-11 receptacle.

Figure 1-3 Cardiograph Rear Panel

- | | |
|-----------------------------------|--------------------------------------|
| A Fuse door | G Serial port (not supported) |
| B AC power switch | H Barcode scanner port |
| C AC power cord | I ECG out (not supported) |
| D Reset button | J PC Card Slot |
| E USB port (not supported) | K PC card eject button |
| F LAN port | L Equipotential post |

Thermal Printer

The cardiograph uses a thermal print head to record waveforms and label the ECG report. The paper supplied with the cardiograph is a thermal paper designed to work with the print head. The paper drawer accommodates both A (8^{1/2} x 11) and A4 size paper. A separate supplied paper shim is required for A4 use.

Philips guarantees the performance of the cardiograph only when used with Philips supplies, accessories, and paper that meets or exceeds Philips specifications.

Touch Screen Display

The cardiograph features a 15-inch touch screen color LCD display. Never touch the screen with sharp objects or you may damage the touch screen surface.

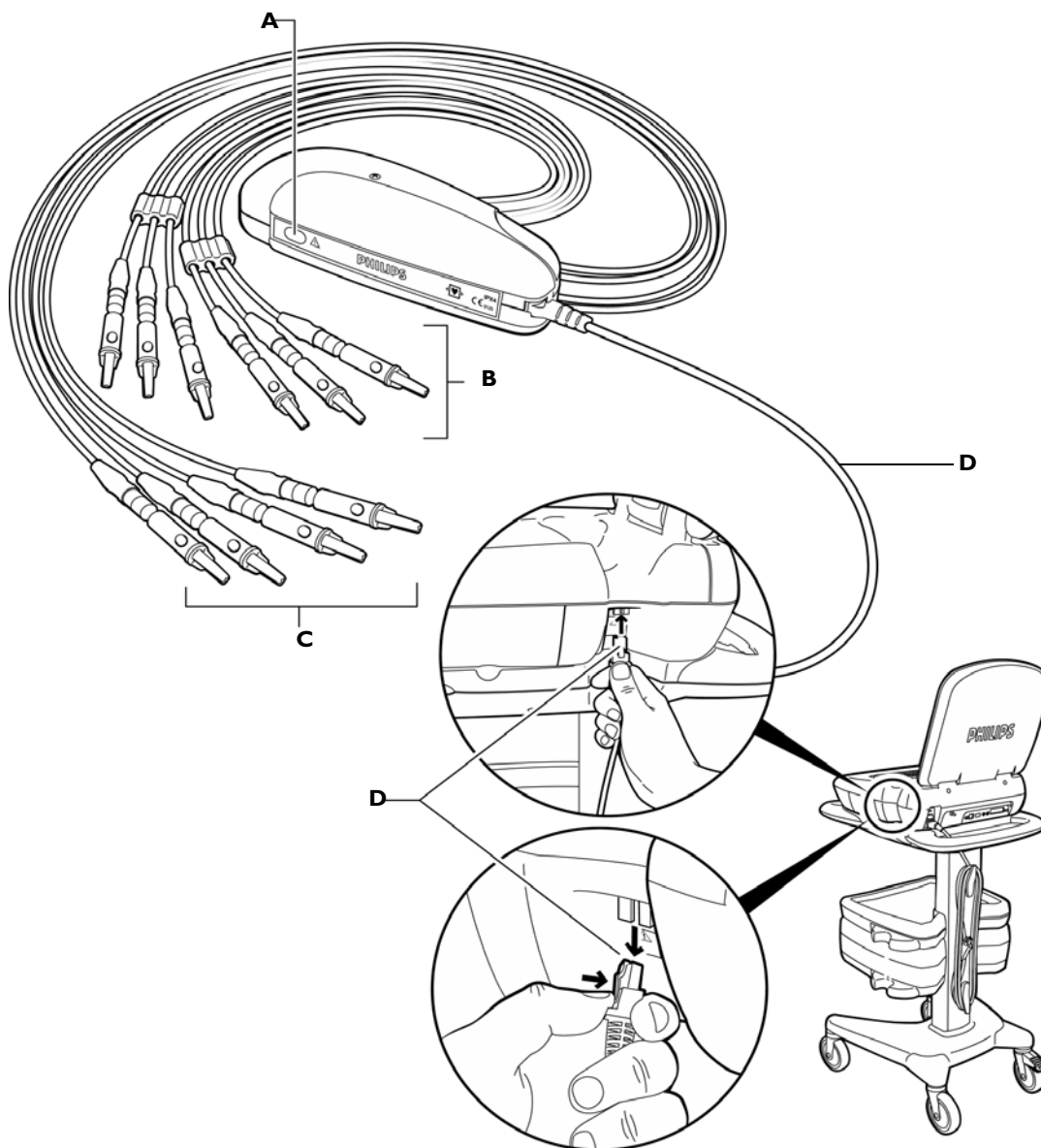
Batteries

The PageWriterTouch is powered by two rechargeable Lithium Ion batteries (989803129131). The cardiograph is intended to be operated primarily on battery power. Proper care of the batteries will ensure a long life. For more details see Battery Maintenance in the *PageWriterTouch Cardiograph Instructions for Use*.

Patient Interface Module (PIM)

The Patient Interface Module (PIM) is a hand-held device that contains all of the cardiograph's waveform data acquisition electronics and a remote multi-purpose key. The PIM connects to the patient data cable and to the lead wires attached to the patient. See Figure 1-4 on the following page.

For details about connecting the lead wires to the PIM, see the *PageWriterTouch Cardiograph Instructions for Use*.

Figure 1-4 Patient Interface Module components

A Action button

B Chest lead wires

C Limb wires

D Patient data cable (connects to RJ-11 receptacle on cardiograph)

Installation

The PageWriterTouch does not require installation by Philips field personnel. The cardiograph is customer-installable. The *PageWriterTouch Cardiograph Instructions for Use* describes the proper setup and configuration of the cardiograph and cart system.

Options and Accessories

The country and region option includes the appropriate keyboard, power cord, printer paper, patient leads, and language. The following table shows the configuration for the country and region.

Table 1-1 Power Cord Part Numbers

Power Cord Key	Philips Part Number (CMS P/N)
900	453563466251 (M5000-61620)
901	453563466261 (M5000-61621)
902	453563466271 (M5000-61622)
903	453563466281 (M5000-61623)
917	453563466301 (M5000-61625)
918	453563466311 (M5000-61626)
920	453563466321 (M5000-61627)
921	453563466331 (M5000-61628)

Table 1-2 Options

Option	Description
A01	PageWriterTouch Cardiograph and Cart System
A02	PageWriterTouch Cardiograph only
C01	Bar Code Reader
C02	Magnetic Card Reader
C03	PCMCIA card ECG storage
C10	Modem Card - U.S. and Canada only
C21	Fax transmission Software
C24	Master 2-step Recording Protocol Software
C41	Wireless LAN SW - Proxim RangeLAN2

Standard Accessories

The standard accessories are based on model number and localization (see “Localization Options” on page 1-16). Accessories include:

- 200 sheets of z-fold paper
 - English paper p/n M2481A
 - Metric paper p/n M2483A
- Tab electrodes p/n 139433
- Alligator clips
 - 989803129231 (AAMI)
 - 989803129241 (IEC)
- *PageWriterTouch Instructions for Use*
- *PageWriterTouch Cardiograph Interactive Training Program*

Upgrades

Upgrades are available to add specific functionality to cardiographs in the field. These upgrades currently include

Part Number	Description
989803127311	Bar Code Reader
989803127321	Magnetic Card Reader
989803127331	PC Card (128 MB storage)
989803127341	Fax Transmission Software
989803127351	Wireless LAN support for the Proxim RangeLAN2 Wireless Card (wireless card not included)
989803127361	Masters’ Two Step Protocol Software (includes Timed ECG and Metronome features)
989803127371	Patient Cable Arm
989803127381	<i>PageWriterTouch Cardiograph Interactive Training Program</i> CD (additional copies)
989803127391	<i>PageWriterTouch Cardiograph Service Documentation</i> CD
989803127401	<i>PageWriterTouch Cardiograph User Documentation</i> CD (additional copies)
989803127411	Patient Interface Module (PIM) (AAMI)
989803127421	Patient Interface Module (PIM) (IEC)

Part Number	Description
989803127431	PageWriterTouch Cardiograph Cart
989803127441	PageWriterTouch Cardiograph Cart Optional Locking Drawer
989803127451	PageWriterTouch Cardiograph Cart Additional Shelf
989803127461	Modem Card (USA and Canada only)
989803127471	LAN Cable (2.13 m/7.0 ft.)

For more information on available upgrades, consult with your sales representative, dealer, or distributor.

Supplies and Ordering Information

The part numbers for all supplies for the PageWriterTouch cardiograph are listed in this section.

NOTE This section describes supply part numbers only. For repair part numbers, see Appendix A, “Cardiograph Subassembly Views.”

Ordering Supplies

You can order all supplies on the World Wide Web at
<http://shop.medical.philips.com>

Use the part numbers listed in this section for reference to ensure that the correct supplies are ordered.

PageWriterTouch Cardiograph Supplies Part Numbers

PIM Patient Data Cables

The Patient Interface Module (PIM) patient data cable connects the PIM to the cardiograph.

Part Number	Description
989803129121	USB Patient Data Cable

Complete Lead Sets

Part Number	Description
989803129161	Complete Lead Set (AAMI)
989803129191	Complete Lead Set (IEC)

Replacement Lead Sets and Accessories

Part Number	Description
989803129141	Limb Lead Set, 99 cm/39 in (AAMI)
989803129151	Chest Lead Set, 61 cm/24 in (AAMI)
989803129171	Limb Lead Set, 99 cm/39 in (IEC)
989803129181	Chest Lead Set, 61 cm/24 in (IEC)
989803129201	Long Limb Lead Set, 137 cm/54 in (IEC)
989803129211	Long Chest Lead Set, 99 cm/39 in (IEC)
989803129221	Long Complete Lead Set (IEC)
989803129231	Alligator Clips for Disposable Tab Electrodes (AAMI)
989803129241	Alligator Clips for Disposable Tab Electrodes (IEC)

Electrodes

Part Number	Description
13943B	Disposable cardiography electrode, resting diagnostic ECG
M2253A	Disposable electrode, adult, resting ECG (not available in Japan)

Printer Paper

Part Number	Description
M2481A	Z-fold, with header, A size (8.5 x 11 in/21.6 x 28 cm)
M2483A	Z-fold, with header, A4 size (8.27 x 11.69 in/21 x 29.69 cm)
M2485A	Anti-fade, A size (8.5 x 11 in/21.6 x 28 cm)
M2486A	Anti-fade, A4 size (8.27 x 11.69 in/21 x 29.69 cm)

Batteries

Part Number	Description
989803129131	Lithium-ion replacement batteries (2 battery packs are required to power the cardiograph)
989803000091	Mobile Battery Charger (USA version)
989803000081	Mobile Battery Charger (UK version)

Localization Options

The following table shows the Philips Medical Systems option number and associated languages/components.

Table 1-3 Localization Options

Option	Country	Labels & User Doc.	Interp. Rpt	Keyboard	PIM/Lead Version	Power Cord Opt.	Default Paper	Locale
ABA	USA/ Canada (English)	English	English	US English	AAMI	903*	A	US
ABC	Canada (French)	French	French	British	AAMI	903*	A	French (Canadian)
ABM	Latin American	Spanish	Spanish	Spanish	AAMI	903*	A	Spanish (Mexican)
ABU	UK	English	English	British	IEC	900*	A4	English (UK)
ABG	Australia	English	English	US English	AAMI	901	A4	English (Australian)
ABB	European English	English	English	British	IEC	902	A4	English (UK)
ABD	Germany	German	German	German	IEC	902	A4	German (Standard)
ABE	Spain	Spanish	Spanish	Spanish	IEC	902	A4	Spanish (Standard)
ABF	France	French	French	French	IEC	902	A4	French (Standard)

Table 1-3 **Localization Options** *(continued)*

Option	Country	Labels & User Doc.	Interp. Rpt	Keyboard	PIM/Lead Version	Power Cord Opt.	Default Paper	Locale
ABH	Netherlands	Dutch	Dutch	US English	IEC	902	A4	Dutch
AB9	Portugal	Portuguese	Portuguese	Portuguese Brazilian	IEC	902	A4	Portuguese (Standard)
ACJ	India	English	English	British	IEC	917	A4	English (India)
AR0	Japan	Japanese	Japanese	Japanese-IBM	IEC	918	A4	Japanese (Kana)
AC8	Argentina	Spanish	Spanish	Spanish	AAMI	920	A	Spanish (Argentina)
ABZ	Italy	Italian	Italian	Italian	IEC	921	A4	Italian (Standard)
AC4	Brazil	Portuguese	Portuguese	Portuguese Brazilian	AAMI	903*	A	Portuguese (Brazilian)
AKJ	Israel & Gaza Strip	English	English	US English	IEC	M5000-61629	A4	English (Israel)
AKV	Chile & others	Spanish	Spanish	Spanish	AAMI	902*	A	Spanish (Chile)
AB4	Singapore & Hong Kong	English	English	British	AAMI	900	A4	English (Singapore & Hong Kong)

* See Table 1-1, "Power Cord Part Numbers," on page 1-12

Contacting a Philips Response Center

The Philips Response Center can assist with product troubleshooting and provide technical expertise to help with any issue with the PageWriterTouch cardiograph or any of its accessories.

For more information on the Philips Response Center go to
www.medical.philips.com/main/services/response_center

North America Response Centers

Country	Telephone Number
Canada	(800) 323 2280
United States	(800) 548-2280

Europe Response Centers

Country	Telephone Number
United Kingdom	07 002 432 58 472 or 07 002 HEALTHRC
Austria	01 25125 333
Belgium	32 2 525 7102 (French) 32 2 525 7103 (Flemish)
Finland	010 855 2455
France	0803 35 34 33
Germany	01850 475000
Italy	0800 8256087
Netherlands	31 4 027 876 30
Spain	34 90 2 304 050
Sweden	08 5064 8830
Switzerland	0800 80 10 23

Asia Pacific Response Centers

Country	Telephone Number
Australia	1800 251 400
China	800 810 0038
Hong Kong	852 2876 7578
Macau	0800 923
India	
New Delhi	011 2695 9734
Mumbai	022 5691 2643/2431
Calcutta	2485 3718
Chennai	044 555 01000
Bangalore	080 5091 911
Hyderabad	040 5578 7974
Japan	0120 381 557
Korea	080 372 7777 (toll free)
Seoul	02 3445 9010
Singapore	1800 Philips
New Zealand	0800 251 400
Philippines	02 845 7875
Malaysia	1800 886 188
Thailand	02 614 3569
Indonesia	021 794 7542
Taiwan	0800 005 616

Other Resources

For additional information on the PageWriterTouch cardiograph, see:

- *PageWriterTouch Cardiograph Getting Started Guide*
- *PageWriterTouch Instructions for Use*
- *PageWriterTouch Cardiograph Interactive Training Program*
- *PageWriterTouch Service Training* touch screen

Theory of Operation

This chapter provides the following information:

System Overview.	2-1
Hardware Logical View.	2-1
Top Level ECG Data Flow and Storage	2-4
Power System Overview.	2-8
Power Management.	2-13

System Overview

The PageWriterTouch system performs acquisition, analysis, presentation, printing, storage, and transfer of ECG waveforms and other patient clinical data.

The PageWriterTouch consists of three major subsystems:

- Main controller
An Intel StrongArm-base single-board computer (SBC) with extensive I/O facilities, running Windows CE 3.0. The Sierra application software runs on the main controller, which includes the display and user-input subsystems.
- Print controller
A Motorola Coldfire-based controller board which provides all the real-time management of the printer. The print controller communicates with the main controller through USB.
- Patient Input Module (PIM)
An Intel StrongArm-based controller running Windows CE 3.0, coupled with a signal acquisition board employing Philips proprietary mixed-signal ASIC technology for ECG acquisition. The PIM communicates with the main controller through USB.

Hardware Logical View

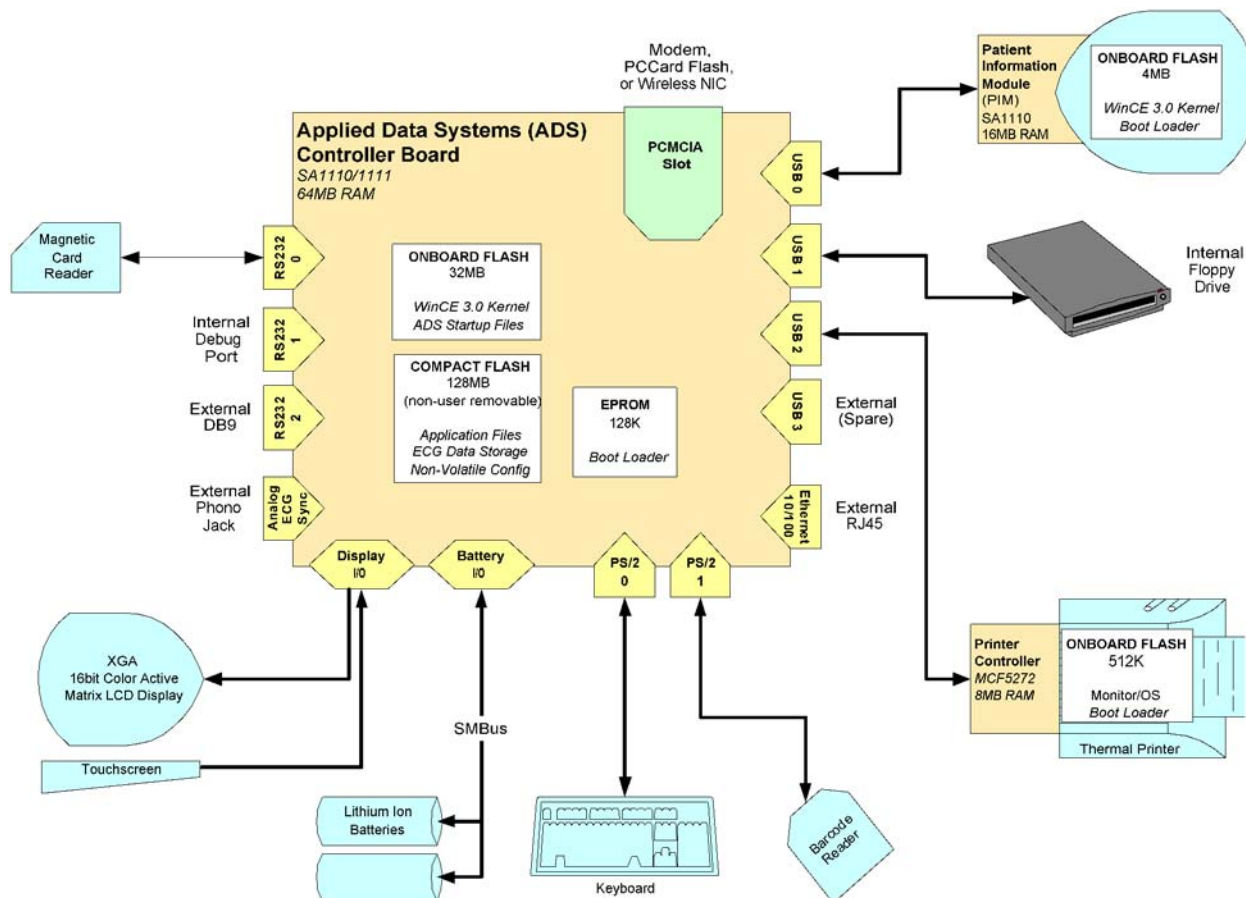
Control of the PageWriterTouch is provided by application software running on the main control board, interacting with numerous hardware and software subsystems. The following are high-level descriptions of these various subsystems.

Main Control Board

The main control SBC contains loader software and the Windows CE kernel image in its internal flash memory (32MB). At system boot, a system RAM test is performed by the loader (onboard RAM is 64MB), and then the Windows CE kernel loads. When CE loads, the application launcher runs, verifying system and executable images before loading the SierraGUI application. All interaction with the operator is through the SierraGUI application. The application software, as well as all ECG archives, are stored on a separate 128MB CompactFlash (CF) card installed in the main control board.

The following demonstrates device and interfaces provided by the main control board.

Figure 2-1 Devices and Interfaces for Main Control Board



The board presents a backplane through the back of the PageWriterTouch case, allowing the user to access interfaces labeled as *external* above, along with the PCMCIA slot, and the PS/2 connection for a barcode reader device.

Display and Touch Screen

The cardiograph display comprises an XGA-compatible, full-color LCD display with backlight and overlaid touch screen. It is driven by the main control board using the MQ200 (MediaQ) graphics accelerator chip and dedicated touch screen support hardware. The touch screen provides finger-tap input substituting for the normal Win32 mouse-click input.

Patient Information Module (PIM)

The PIM is an SA1110-based WinCE subsystem, which is connected by USB to the main control board. It provides real-time data acquisition of ECG signal from an electrode connected patient.

Printer Control (USB)

The printer control board is a Motorola Coldfire processor-based control board for the PageWriterTouch thermal printer mechanism. The board is connected by USB to the main control board and is powered by the power circuit of the main control board. It provides ECG waveform rendering and basic bitmap imaging operations, and uses a PCL-like control language API for page description and feed control. It controls the print head, motor, and detects drawer-open and top-of-form.

Floppy Disk Drive (USB)

The cardiograph has a USB 3.5" floppy disk drive., which provides DOS HD 3.5 floppy disk read-and-write access. It works with the supplied WinCE2.0 driver USBFDD.DLL.

Smart Batteries (SMB)

The cardiograph uses twin 10.8V lithium ion batteries, which provide industry-standard SMB power management and communications support. Charging and switching of batteries is dictated by the main control board.

Keyboard (PS/2)

The cardiograph includes a laptop-format, PS/2, sealed, full key action keyboard. It includes a keyboard matrix and daughter board, which provides language-specific keyboard support and decoding via PS/2 and standard WinCE device drivers for key input into PageWriterTouch. Powered by PS/2 connection.

Magnetic Card Reader (Serial)

Also available is a magnetic card strip reader, which provides ISO and standard encoded magnetic strip support via RS-232 serial internal connection to main control board. Manual removal and insertion is required.

Barcode Reader (PS/2)

Also available is a keyboard-emulating barcode scanner and reader from Metrologic, which connects through an external PS/2 connector and provides standard barcode scanning capability. It emulates a keyboard, allowing scanned codes to be presented to the PageWriterTouch cardiograph as if they had been typed on the standard keyboard, powered by PS/2 connection. The barcode reader can be configured using special barcodes.

Top Level ECG Data Flow and Storage

General ECG flow begins with acquisition by the Patient Interface Module (PIM) from electrodes placed on a patient. Data is streamed real-time to the main control board, where it is received into the application buffers in RAM. These buffers are used to present the signal data on the real-time screen. When the user initiates an auto report print, presses the snapshot button on the PIM or display, or is using timed ECG acquisition, corresponding 10-second segments of the signal data are then copied to the temporary ECG storage memory in RAM.

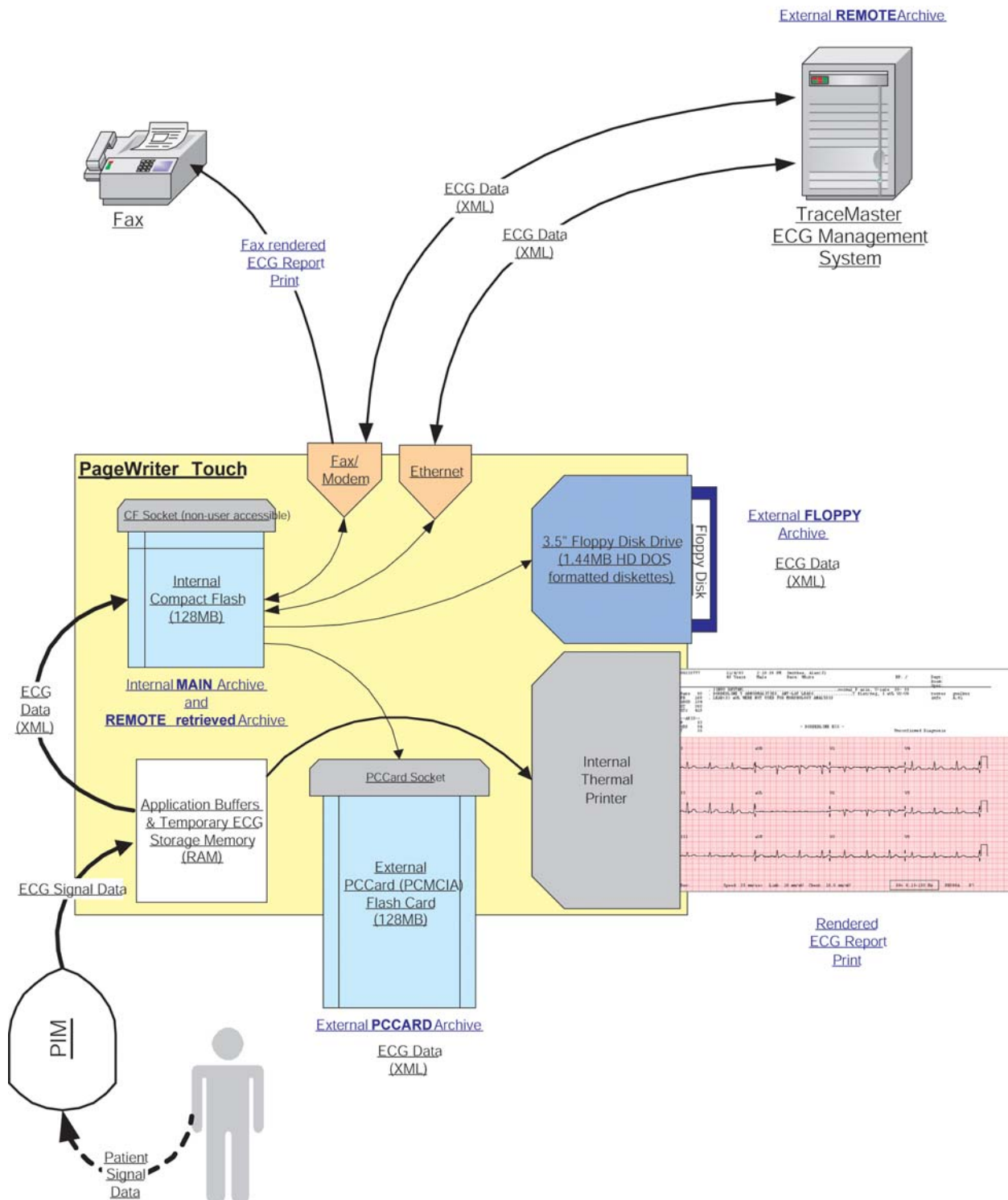
These 10-second segments are named ECG reports that can be previewed and printed. In the case of Auto mode, the ECG report is automatically printed after copying. An ECG report contains signal data, analysis information, patient demographics, PW, and acquisition information, along with operator and device information. See the PageWriterTouch XML documentation for a complete description of the contents of the ECG data record.

If automatic save after print is set, or the user explicitly selects **Save** on the Index mode screen, the ECG report is saved in XML format to the internal main archive. This archive is non-volatile and resides on the internal CompactFlash (CF) card. Index files with a CDB extension are also maintained in this archive.

From the internal main archive, the ECG XML data format files can be copied, deleted, previewed, printed, and transferred to other devices. The internal main archive cannot receive ECG XML files from external devices. Retrieved ECG file storage is limited to the internal remote archive.

NOTE PageWriterTouch-generated ECG XML files comply with the Philips Medical Systems ECG XML Schema version. They incorporate an embedded CRC32 value, which is used to ensure the data integrity of the file.

Figure 2-2 ECG Flow and Storage



Internal Main Archive

The internal main archive resides on the internal CompactFlash (CF) card, and is used as the primary ECG data repository. ECG XML files and related index files are stored here in the SierraArchiveInternal directory. All stored ECG files transition through this archive prior to transfer or copying to other devices, such as the PC card or external FLOPPY archives.

Currently, the internal main archive is limited to a maximum of 150 ECGs when combined with the internal remote archive. For example, 50 ECGs stored in the internal main archive, and 50 ECGs stored in the internal remote archive result in a remaining available storage of 50 ECGs. These can then be saved in either the internal MAIN or REMOTE archives.

Internal Remote Archive

The internal remote archive resides on the internal CompactFlash (CF) card much like the internal main archive. All XML files retrieved from remote sites, such as the TraceMaster ECG Management system, reside in this archive until deleted. ECG XML files and related index files are stored in the SierraArchiveRemote directory.

Currently, the internal remote archive is limited to a maximum of 150 ECGs when combined with the internal main archive. For example, 50 ECGs stored in the internal main archive, and 50 ECGs stored in the internal remote archive result in a remaining available storage of 50 ECGs. These can then be saved in either the internal main or remote archives.

External PC Card Archives

The external PC card archives reside on compatible PC card inserted into the PC card slot. Files may then be transferred to inserted cards using the Archive mode features of the PageWriterTouch, and are stored as an XML format. An index file is created and maintained on each PC card when CDB files are transferred or copied from the card. Currently, an external PC card archive is limited to a maximum of 100 ECGs.

NOTE When you add or delete compatible ECG XML files from a PC card (not using the PageWriterTouch), it is recommended that you delete all CDB files prior to reinserting into the PageWriterTouch. In the absence of an index file, the PageWriterTouch automatically regenerates the index based on the XML files on the PC card.

External Floppy Archives

The external floppy archives reside on compatible 3.5" HD DOS formatted floppy disks that the user inserts into the PageWriterTouch floppy disk drive. Files may then be transferred to an inserted disk using the Archive mode features. Files are then stored in an XML format. An index file is then created and maintained on each floppy disk when CDB files are transferred or copied from the PC card. Currently, an external floppy archive is limited to a maximum of 5 ECGs. The maximum may be decreased if any file contains noisy or complex signal data, which then produces larger compressed data.

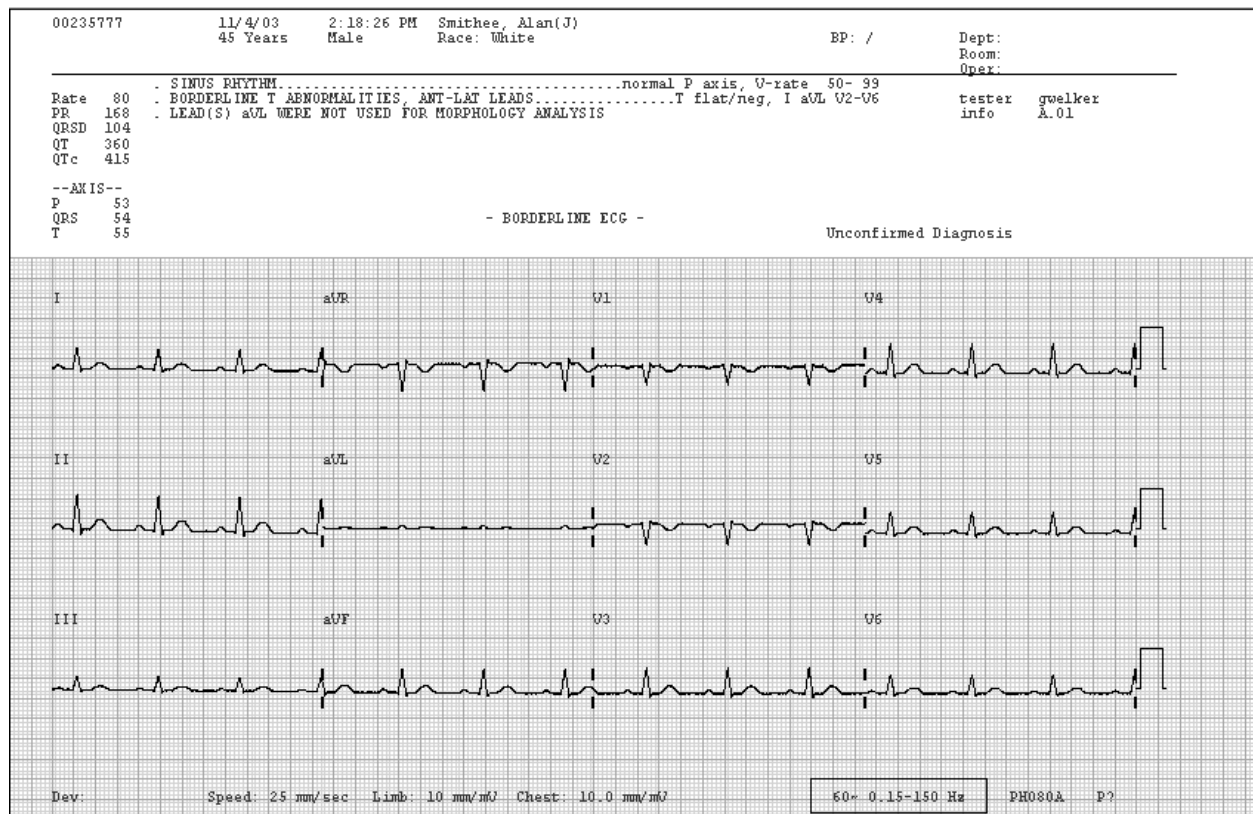
NOTE When you add or delete compatible ECG XML files from a floppy diskette (not using the PageWriterTouch), make sure to delete all CDB files prior to reinserting into the PageWriterTouch. In the absence of an index file, the PageWriterTouch automatically regenerates the index based on the XML files on the PC card.

Rendered ECG Report Prints

A rendered ECG report print is a representation of the ECG data. This includes a high-resolution print of the signal data, and may include configured patient demographics, acquisition information, and other non-signal data elements.

The PageWriterTouch allows the user to customize the fields on an ECG report print. The print may consist of one or more continuous pages on perforated thermal media from the printer.

Figure 2-3 Rendered ECG Report Print Sample



Fax-Rendered ECG Report Print

A fax-rendered ECG report print is equivalent to the rendered ECG report print, as described in the previous section, except it has been adjusted to comply with fax transmission and resolution device requirements. The ECG report is rendered and transmitted using the optional fax and modem PC card when a remote fax site is pre-configured into the unit, and the user indicates a fax transfer should occur.

The fax-rendered ECG report print may be stored on the received system end as an electronic file, and not actually used to produce a printed copy.

Power System Overview

The PageWriterTouch power system consists of a 65-watt AC/DC medical grade power supply, two (2) 6.6 Amp-hour lithium ion smart batteries, battery charging circuitry, various voltage regulators, and logic circuitry to provide for smart battery operation.

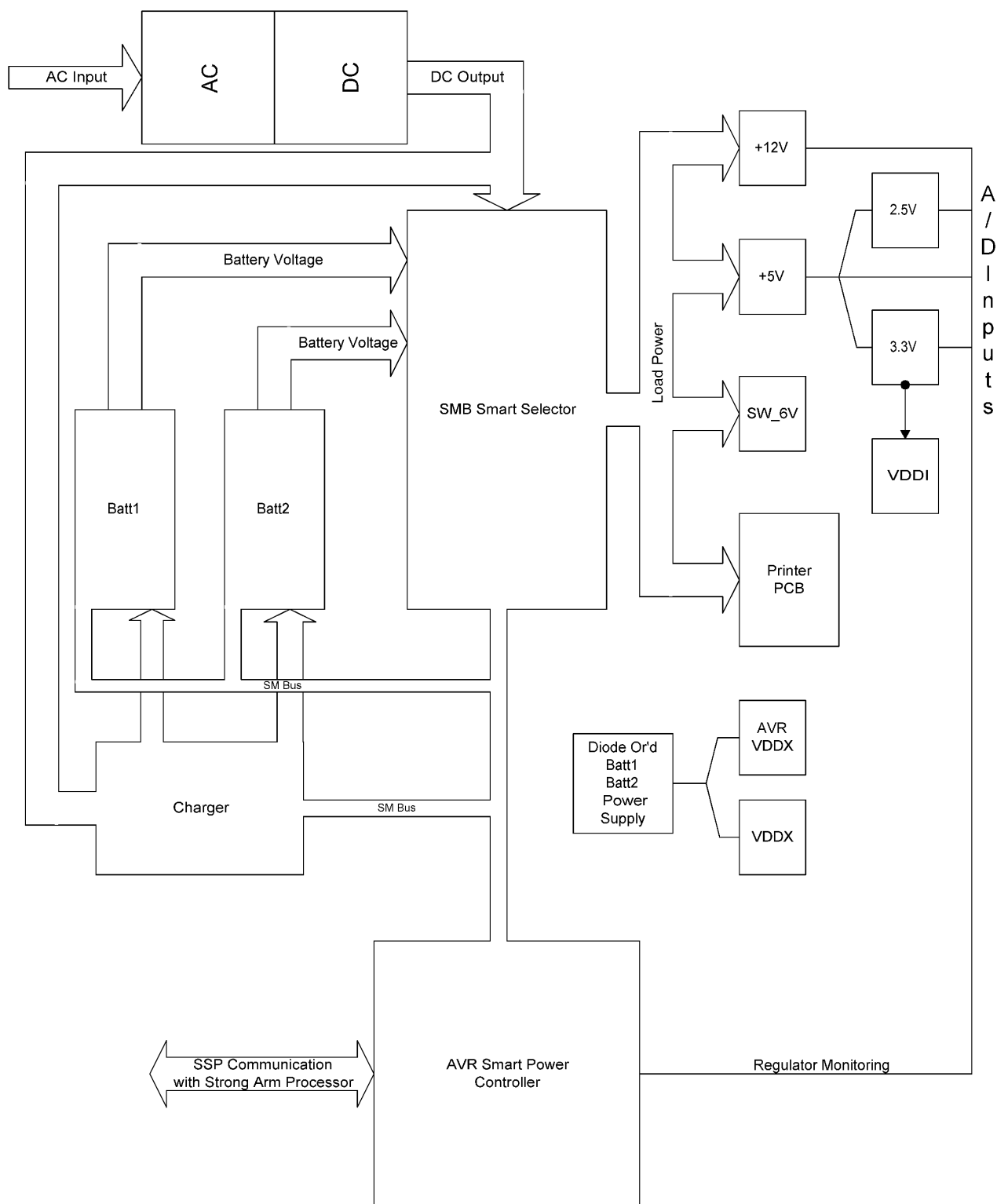
The PageWriterTouch is designed to run primarily on battery power, using the AC power for recharging. However, the PageWriterTouch may operate solely from AC power without batteries. The power system is a smart system that incorporates the standard System Management Bus (SMBus). Each battery contains electronics that communicate with the system power processor reporting the condition of the battery, its Charge State, and other parameters. Some of these parameters can be viewed on the Service Utility screen. A smart switch controls the switching between the two batteries and the AC power. Recharging the batteries is handled by an SMBus-compliant charger. A three-channel multiplexer is used to switch the two batteries, data lines, clk line, and thermistor line. This way, only one battery at a time is active on the SMBus. Working as a system, the system power processor receives commands from the StrongArm host system processor. These commands report the values of the monitored voltages (which reports the condition of the batteries) to switch between the two, depending on the relative state of charge (SOC), or to calibrate the batteries. Other power-related functions are controlled directly by the system power processor. Several functions of the power system are controlled by the software, either by the host StrongArm processor or the system power processor. These include:

- Switching between batteries, depending on the charge condition.
- During power up, reads the battery with the lowest charge, and then recharges it.
- Restricting the user from printing when the charge capacity of the batteries reaches preset levels.
- Activating sleep mode if no activity is detected for a preset period of time.
- Warning the user of the charge state for the batteries with a battery icon and warning messages.
- Alerting the user when maintenance is needed for the batteries.
- Monitoring voltage regulators, and taking the necessary action in the case of a failure.

The major power draws within the PageWriterTouch are the LCD display backlights, which can draw up to 21 Watts, and the thermal printer which can draw about 48 watts. Provisions have been incorporated into the PageWriterTouch to allow the user to modify the display brightness. To extend battery life, set the display brightness to low or medium level. Also, the power save (dims the screen) mode should be activated to further extend battery life. The printer control board is current limited for normal printing, however, if print demand is too high, the current limiter will not print the output, resulting in a faded page.

Batteries

The two (2) 6.6 Amp-hour lithium ion smart batteries provide the primary means of power to the PageWriterTouch, and are specifically designed for this purpose. The batteries provide a high-current discharge as needed for thermal printing. Each battery supplies a continuous 6.0 Amps, with $6.5A \pm 2\%$ provided for short period. Built-in protection circuitry in each pack prevents damage to the battery by overcharging, over discharging, over current, and over temperature. Each battery has its own visual charge indicator. Batteries are good for approximately 300 full charge and discharge cycles before their capacity begins to diminish.

Figure 2-1 Power System Block Diagram

SMBus Smart System

The power system in the PageWriterTouch is based on the SMBus smart system. The battery packs are fully compliant with SMBus and SBDS Revision 1.0, and communicate with the rest of the power system using this SMBus. An system power processor is used for the power system controller, which provides several functions to the system. These include:

- Monitoring regulator voltage.
- Enabling and disabling regulator power.
- Communicating (SMBus) with the charger, batteries, and smart switch.
- Preprogramming battery shutdown levels.
- Monitoring the supply location to run the system.
- Switching between batteries, depending on the charge condition.
- Monitoring the on and standby switch, and then reporting the status to the host processor.

Power Labels

The following represent the various power labels used in the PageWriterTouch.

DC_PWR

The DC voltage direct from the AC power. The voltage level is between 14.5V and 15.0V, with a maximum power output of 65 watts.

VBATT1

The voltage of battery Number 1. Voltage range is between 8.0V and 12.6V. Discharge current is limited to a continuous 6 amps continuous, with a 6.5 amp limit for short periods.

VBATT2

This is the Voltage of the Number 2 Battery. Voltage range will be between 8.0V to 12.6V. Discharge Current is Limited to 6 amps continuous with a 6.5 amp limit for short periods.

LDO_PWR

The Diode Or'd voltage for the available supplies, DC_PWR, VBATT1, and VBATT2. LDO_PWR is continually powered up to maintain power for the low drop-out regulators that supply power for the power control processor.

LOAD_PWR

The voltage of the current supplied voltage. If the AC power cord is plugged in, the LOAD_PWR voltage is approximately 14V. If not, then the LOAD_PWR voltage is from the battery with the highest capacity when the system loses AC power. In all cases, the voltage is lower then if measured directly at the source due to voltage drops across the switching fets. The measured voltage is between 8.0V and 14.0V

AVR_VDDX

Output from U46 regulator, an MIC5203, for the system power processor. The voltage level is 3.3V, and can provide up to 80mA of current. This voltage is not monitored.

VDDX

Output from U47 regulator, an MIC5203, which is the primary power for the main system processors and memory. The voltage level is 3.3V, and can provide up to 80mA of current. This voltage is not monitored.

VDDI

Output from the U20 circuit, an LTC1627, which is 1.75V core power for the main system processor. The input to this regulator is from the 3.3V supply, and can supply up to 500mA of current. This voltage is not monitored.

VCC

Output from the U19 circuit, an LTC1374, which supplies all the 5.00V power to the system. Input is from LOAD_PWR, and output is 5.00V with a maximum current of 4A. This voltage is monitored by the system power processor, with a tolerance of +/- 10%.

+12V

Output from the U48 circuit, an LT1371, which supplies voltage to the back light display. The +12V is a step-up regulator that outputs 12V when supplied by the batteries, however it can pass through the higher DC_PWR of up to 15V if the AC power cord is plugged in. The +12V regulator can supply up to 3A of current.

+2.5V

Output is from the U17 regulator, an LM317, with input from the VCC regulator. The +2.5V linear regulator supplies 2.5V at 1A of current. This voltage is monitored.

+3.3V

Output from the U22 regulator, Supplied by the VCC regulator, this switching regulator will supply 3.3V at up to 1.25A of current. This voltage is monitored.

SW_6V

Output from the U44 regulator, supplies recharge voltage for the future wireless pod. The SW_6V is not used at this time.

Charge

Power output from the charger control section of the power system. This power is only used for recharging the batteries. Voltage is approximately 12.6V, with a current that varies from 3A down to 0mA, depending on the operation mode of the system.

Power Management

Battery Charging Logic

The system host processor, working in conjunction with the system power processor processor, controls several functions of the power system. These include:

- Controlling the battery switch-over points.
- Activating sleep mode if no activity is detected for a preset period of time.
- Restricting the user from printing when the charge capacity reaches preset levels.
- Controlling the re-calibration cycle.
- Warning the user of the charge capacity with a battery icon and warning messages.
- Alerting the user when maintenance is needed for the batteries.

Battery Fuel Gauge

The battery fuel gauge on the PageWriterTouch LCD display consists of five segments. The battery charge displayed is an average of both batteries. When both batteries are fully charged, all five segments are displayed. The battery fuel gauge is mapped to average battery charge, as follows.

Table 2-1 Battery Fuel Gauge

Average Charge	Segments
84% - 100%	five segments
68% - 83%	four segments
52% - 67%	three segments
36% - 51%	two segments
20% - 35%	one segments
<20%	zero segments

As the average charge level decreases, printing may be disabled. When the average charge decreases to 20%, the PageWriterTouch warns the user to plug in the AC power cord to continue. The average battery charge can be calculated as follows:

Average Battery Charge = (Battery1 Percent Full x Battery2 Percent Full) / 2 where the Percent Full values are read from the Service Utility screen.

Battery Discharging

The system power processor and host processor controls the battery switching so the batteries can be discharged separately. When a battery is discharged to 30%, the system power processor and host processor switches to the other battery. When both batteries are discharged to the 30% level, the PageWriterTouch disables high-demand printing, and continues to allow both batteries to be discharged to a 20% level. When the 20% level is reached on both batteries, the PageWriterTouch disables printing, and warns the user to plug in the AC power cord. If the AC power cord is not plugged in within three minutes, the PageWriterTouch automatically enters to sleep mode.

Battery Charging

When the AC power cord is plugged in, the system power processor and host processor charges each battery separately. When one battery is fully charged (100%), the AVR and host processor charges the other battery.

Charge Current

When the unit is in operating mode, the charge current is 500mA. When the unit is in sleep mode, the charge current is dependant on the battery. The initial charge is approximately 3A, and then slowly reduced over time.

Battery Calibration

The batteries must periodically undergo re-calibration to ensure that the status display accurately reflects the actual condition of the batteries. Over time, the accuracy of the information from the batteries decreases as the batteries undergo multiple charge and discharge cycles. The user may observe this as a decrease in battery operating time between full charges. A wrench icon, located next to the battery icon, displays when the batteries need to be re-calibrated. The user can access the Maintenance screen to start the calibration cycle. The PageWriterTouch cannot be in use, and the AC power cord must be plugged in for the entire cycle.

Each battery requires up to 12 hours for calibration. If calibration is disrupted, the entire process must be restarted. However, calibration is performed on one battery at a time. If the first battery is calibrated, the process remembers, and then calibrates, only the second battery. A standalone battery charger with calibration function is available from PMS Ultrasound.

Battery Information

Battery information is sent from each battery to the AVR over the SMBus. This information is then sent up to the host processor, and can be viewed from the Service Utility screen. See “Battery Info” on page 5-7 for more information.

Cardiograph Care and Maintenance

This chapter contains information on basic cardiograph care and periodic maintenance. If further technical assistance is required, contact the nearest Philips Response Center (see page 1-18). The PageWriterTouch does not require scheduled preventive maintenance. Basic cleaning and maintenance guidelines are also included in the Maintenance chapter of the *PageWriterTouch Cardiograph Instructions for Use*.

This chapter is organized as follows:

Cardiograph and PIM Cleaning.	3-1
Cleaning the Print Head	3-3
Replacing the Printer Paper.	3-4
Battery Maintenance and Care	3-5
Replacing the AC Fuses	3-8
Replacing the Lead Wires in the PIM.	3-10
Cardiograph and Accessory Disposal	3-12
Maintaining the Touch Screen.	3-12
Setting the Date and Time.	3-13
Maintaining the Floppy Disk and Disk Drives	3-14
Configuring the Bar Code Reader.	3-14
Maintenance Tests.	3-17

Cardiograph and PIM Cleaning

To clean the cardiograph and PIM

- 1 Unplug the AC power cord.
- 2 Ensure that the AC power switch on the rear of cardiograph is turned to the Off position and that the green AC power light is not lit.
- 3 Wipe the external surfaces of the cardiograph and the PIM with a soft cloth dampened in any of the approved cleaning solutions listed below.

CAUTION When cleaning, avoid the lead wire connectors and patient data cable connectors.

Approved Cleaning Solutions

CAUTION The cardiograph or PIM should not be autoclaved, ultrasonically cleaned, or immersed.

Do not use strong solvents or abrasive cleaning materials.

Do not spill liquids on the surface of the cardiograph.

Do not use any of the following to clean the cardiograph:

- Acetone
- Iodine-based cleaners
- Phenol-based cleaners
- Ethylene oxide sterilization
- Chlorine bleach
- Ammonia-based cleaners

The approved cleaning solutions are:

- Mild soap and water
- Isopropyl alcohol

Cleaning the Patient Data Cable and Lead Wires

CAUTION

Do not:

- Use isopropyl alcohol
- Autoclave the patient data cable or lead wires or use ultrasonic cleaners
- Immerse
- Use abrasive materials
- Wet the connectors

To clean the patient data cable and lead wires

- 1 Dampen a soft cloth with soapy water or with one of the disinfectants or cleaning agents listed below.

Clean patient data cable and lead wires with any of the following:

- Lysol disinfectant
- Lysol Deodorizing Cleaner (may discolor patient data cable)
- Dial liquid antibacterial soap
- Ammonia
- 409 (may discolor patient data cable)
- 10% solution of Clorox in water (may discolor patient data cable)
- Murphy household cleaner

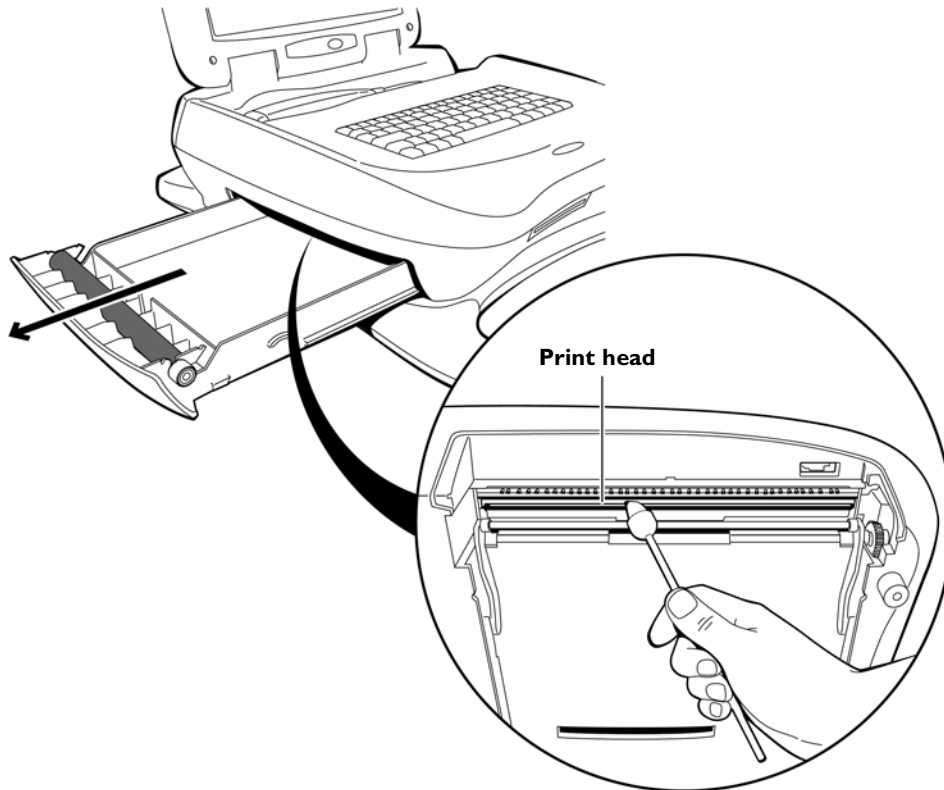
- 2 Wring excess moisture from the cloth before cleaning.

Cleaning the Print Head

A dirty print head may cause poor or uneven print quality.

TIP Clean the print head more frequently when printing large volumes of ECGs.

Figure 3-1 Paper Drawer and Print Head



To clean the print head

- 1 Open the paper door on the left side of cardiograph.
- 2 Wipe the print head lightly with a foam swab dipped in 90% alcohol.
- 3 Allow the print head to dry.

Replacing the Printer Paper

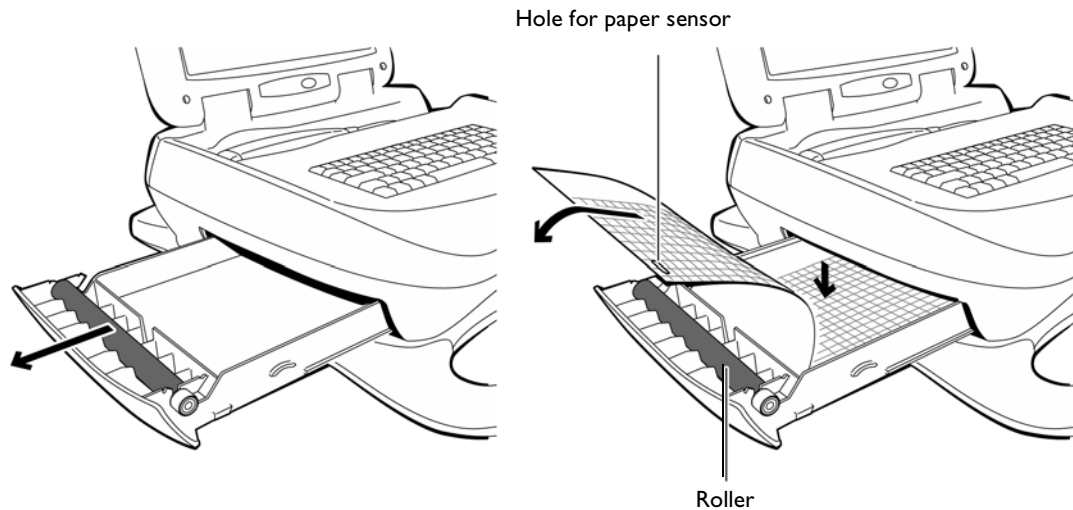
Replace the printer paper when a red stripe appears on the printed ECG report. Only use Philips Medical Systems replacement printer paper.

WARNING Do not use PageWriter XL printer paper with the PageWriterTouch cardiograph.

To change the printer paper

- 1 Open the paper drawer (left side of cardiograph) and remove any remaining sheets.
- 2 Insert a new pack of printer paper with the printed side facing up. Make sure that the hole for the paper sensor is positioned as shown below.
- 3 Drape the first sheet over the roller.
- 4 Close the paper drawer.

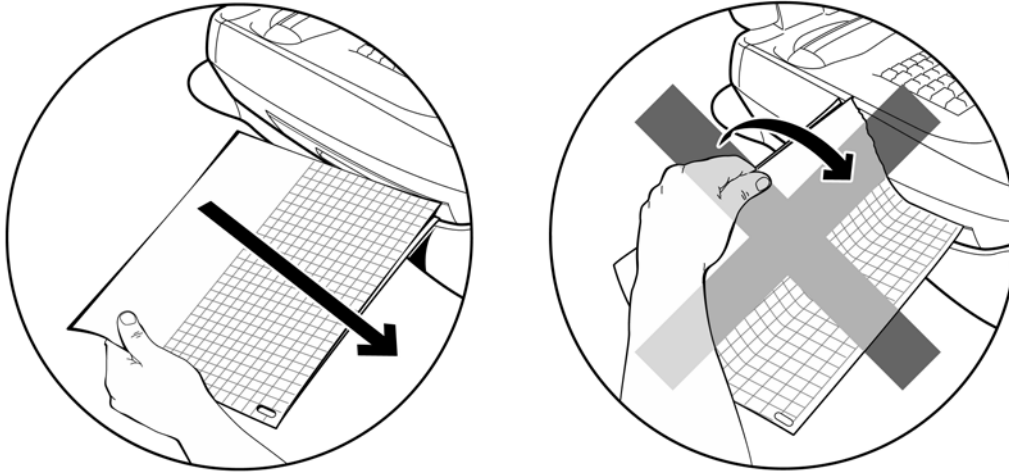
Figure 3-2 Changing Printer Paper



Tearing off the Printer Paper

Tear off the printer paper as shown.

Figure 3-3 Tearing Off Printer Paper



Battery Maintenance and Care

The cardiograph has two removable lithium ion batteries that supply power to the cardiograph during mobile use, and power the cardiograph printer while it is plugged into AC power.

With the batteries fully charged, the cardiograph can print up to 50 Auto ECGs or provide 40 minutes of continuous Rhythm printing.

For optimal battery performance:

- Only use Philips Medical Systems lithium ion batteries (Philips part number 989803129131) with the cardiograph.
- Fully recharge the batteries before AC or mobile use. Regularly and consistently charging the batteries will prolong battery life.
- Charging the batteries at temperatures above 45 °C (113° F) can damage the batteries and reduce overall battery life.
- Check the battery power indicator on the Status Bar. Touch the battery icon on the Status Bar for information on remaining battery power.
- Configure and turn on the Battery Saving Modes (Power Save, Standby) in Configuration.
- Put the cardiograph into Standby mode when not in use.
- Always charge the batteries when the cardiograph is not in use. Plug the cardiograph into AC power. Ensure that the AC power switch is turned to the On position, and that the green AC power indicator light is on. The batteries will charge while the cardiograph is in use, but will charge at a slower rate.

- The use of cardiograph accessories (bar code reader, magnetic card reader, floppy disk drive, PC card, modem) will deplete battery power at a faster rate. The batteries will require more frequent charging if these accessories are used with the cardiograph.
- Reduce the display brightness to prolong battery life.
- Operate the cardiograph, charge the batteries, and store the batteries at a room temperature of 25 °C (77° F) or lower. Exposure to higher temperatures may reduce battery life, damage the batteries, and degrade overall cardiograph performance.
- If the cardiograph will be stored for more than 30 days without use, turn the AC power switch to the Off position and remove the batteries. If batteries are left in the cardiograph for an extended period of time without charging, the batteries will be depleted and will automatically shut down to avoid damage. The batteries will require a full recharge, and a battery calibration before they can be used again.
- A set of fully charged batteries stored outside the cardiograph will need to be recharged every six months. Batteries that are stored outside of the cardiograph for extended periods of time will not be damaged, but may require a full battery calibration before use.

Charging the Batteries

Charge the batteries whenever the cardiograph is not in use. An optional external mobile battery charger may be purchased to charge the batteries away from the cardiograph.


The batteries will charge when the cardiograph is in use and is plugged into AC power, with the AC power switch set to the On position, but will charge at a slower rate.

Table 3-1 Battery Charge Rates

If the cardiograph is in...	Time to charge batteries to 95%
Standby	360 minutes
Active use	1440 minutes

Check the Battery Level Indicator on the Status Bar to confirm that the batteries are fully charged.

Calibrating the Batteries

The batteries require periodic calibration to ensure that accurate power level information displays on the cardiograph. A wrench icon  appears on the Battery Level Indicator on the Status Bar when the batteries require calibration.

Touch the Battery Level Indicator (on the Status Bar) to display the Battery Status window. A message will appear if the batteries require calibration.

If the batteries have been stored inside or outside of the cardiograph for 30 days or more, a battery calibration is recommended before use.

Full battery calibration can take up to 12 hours per battery. The batteries can be calibrated outside of the cardiograph with the optional mobile battery charger.

To calibrate the batteries on the cardiograph

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab.
- 4 Touch **Battery Calibration**.

The Battery Calibration window appears and displays a message confirming that calibration is required.

- 5 Touch **Start** to begin battery calibration.

NOTE If battery calibration is not required, the message *Calibration Not Required* appears and the calibration process stops. Touch **Stop**, then touch **Cancel** to close the window.

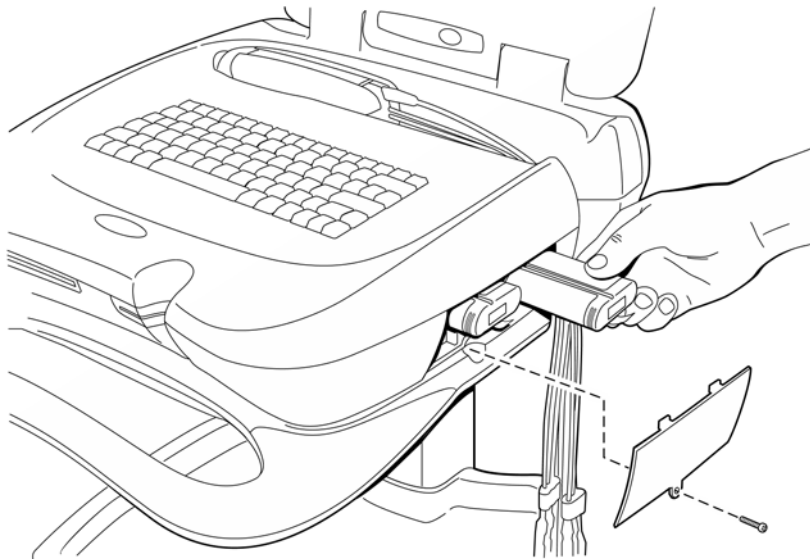
Replacing the Batteries

WARNING Properly dispose of or recycle depleted batteries according to local regulations. Do not disassemble, puncture, or incinerate the disposed batteries.

There is a danger of explosion if the batteries are not replaced correctly. Carefully follow the instructions for replacing the batteries. Only use batteries with Philips part number 989803129131.

How often batteries need to be replaced depends on how well the battery is maintained and how much it is used. If the batteries are fully charged but lose significant power after only a few ECGs, even after a calibration cycle, consider replacement.

Figure 3-4 Replacing the Batteries



To replace the batteries

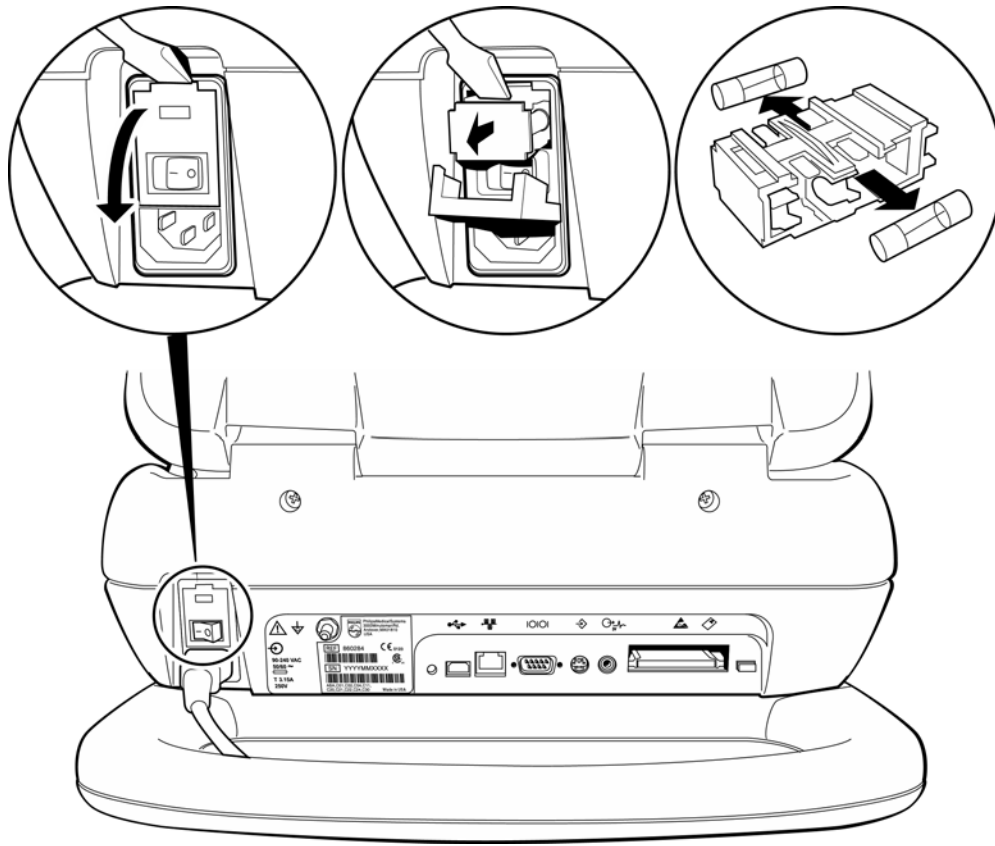
- 1 Disconnect the cardiograph from AC power and ensure that the AC power switch (rear of cardiograph) is turned to the Off position with the AC power indicator light off.
- 2 Unscrew the battery door using a Philips head screwdriver.
- 3 Pull the white tabs to remove the batteries.
- 4 Insert the new batteries at the same time, with the white pull tabs facing out.
- 5 Reattach the battery door.
- 6 Plug the cardiograph back into AC power and turn the AC power switch to the On position. Check that the green AC power indicator light is on.
The PageWriterTouch starts up in normal operating mode.
- 7 Place the unit in Standby mode to charge the batteries.
- 8 Charge the batteries for at least 24 hours before use.

NOTE The batteries may be charged with the optional mobile battery charger (see page 1-16).

Replacing the AC Fuses

The AC fuses need to be replaced when the cardiograph is plugged into AC power, with the AC power switch turned to the On position, but the AC power indicator light does not illuminate. If the light does not illuminate when the cardiograph is plugged in, you must replace the fuse.

Only use Philips Medical Systems replacement AC fuses, part number 453563485231. For information about ordering replacement parts, see Appendix A, “Bottom Housing Assembly Parts List”, Table A-2, “Bottom Housing Assembly Parts List,” on page A-5.

Figure 3-5 Replacing the AC Fuses**To replace the AC fuses**

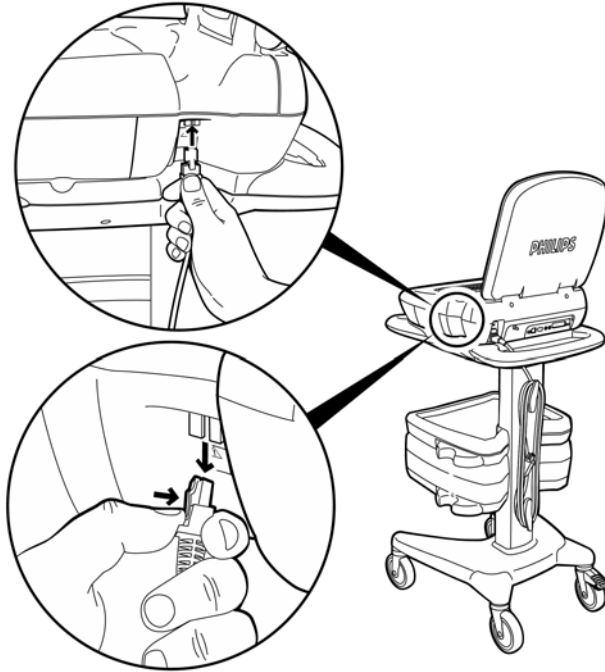
- 1 Unplug the cardiograph from AC power. Pull out the AC power cord from the rear of the cardiograph.
- 2 Locate the fuse door above AC power switch.
- 3 Insert the end of a flat blade screwdriver into the notch at the top of the fuse door. Pull down gently to open the fuse door and expose the fuse holder.
- 4 Gently remove the fuse holder from the power entry module.
- 5 Remove the fuses from the fuse holder.
- 6 Insert the new fuses into the holder.

The back end of the fuse will slightly protrude out of the fuse holder to make contact with a terminal inside the power entry module.

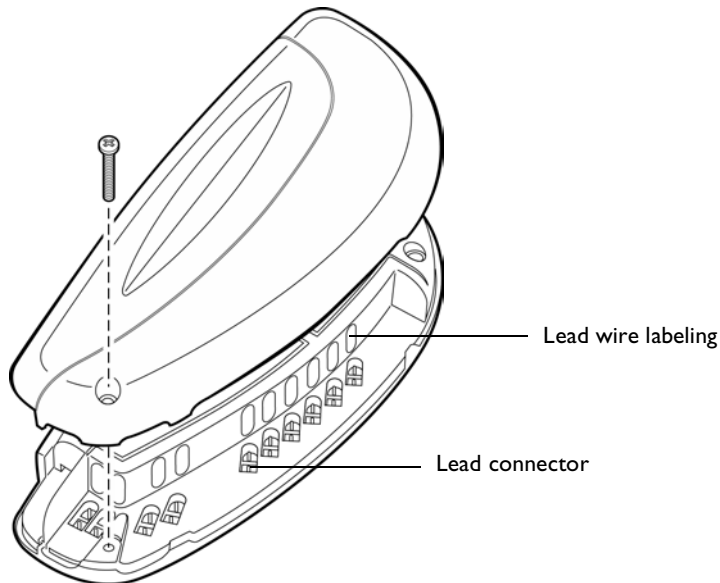
Replacing the Lead Wires in the PIM

To replace the lead wires

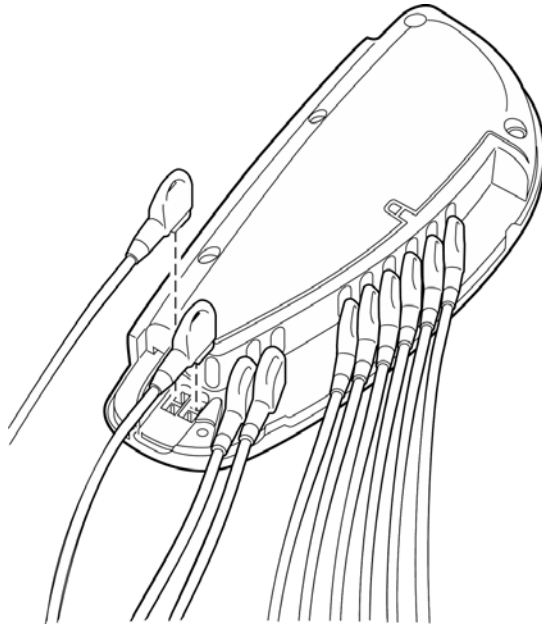
- 1 Disconnect the PIM from the RJ-11 receptacle on the right side of the cardiograph.



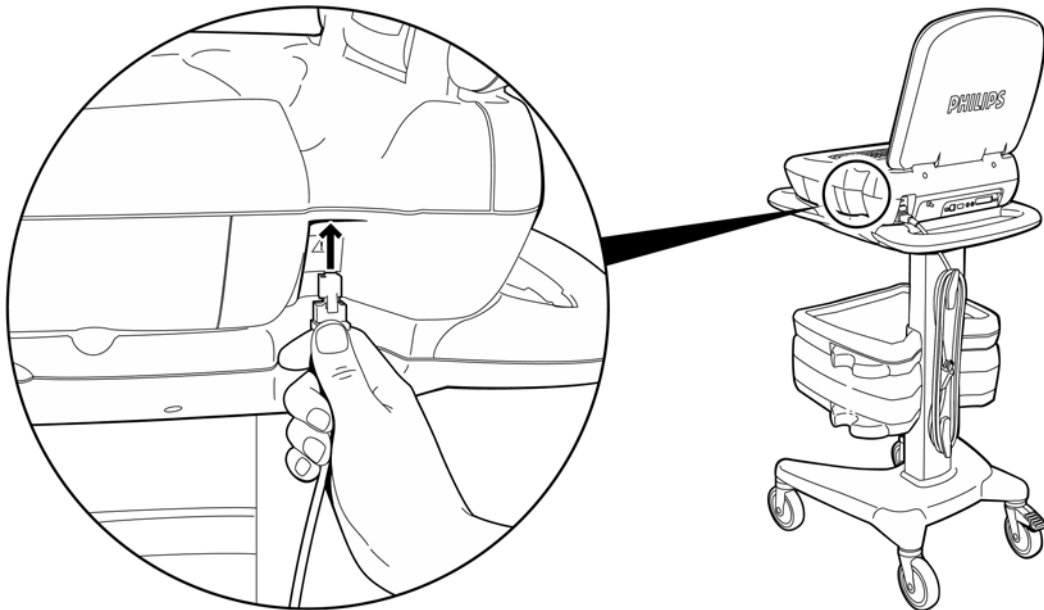
- 2 Unscrew the PIM cover using a Phillips head screwdriver.
- 3 Remove the PIM cover to expose the lead wire connectors. The inside of the PIM is labeled to identify the lead wire connections.



- 4 Remove the lead wire(s) by pulling the connector up.



- 5 Match the lead wire labeling on the lead with the same lead wire connector on the PIM. Replace the lead wire by firmly pressing the connector into the socket until fully seated.
- 6 Reattach the PIM cover.
- 7 Reattach the patient data cable to the RJ-11 receptacle on the right side of the cardiograph.



WARNING To ensure safety and prevent damage to the system, connect the patient data cable **ONLY** to the correct RJ-11 receptacle on the right side of the cardiograph.

Cardiograph and Accessory Disposal

When the cardiograph has reached the end of its product life, dispose of it according to local ordinances. When any of the cardiograph accessories reach the end of their product life, dispose of these items in accordance with manufacturer instructions and local ordinances.

Maintaining the Touch Screen

The touch screen may require occasional maintenance, including calibration and cleaning.

Calibrating the Touch Screen

The touch screen may be calibrated at any time. Calibration is recommended if it requires many attempts to select an item on the screen, or if selecting items on a specific area of the screen is difficult.

The touch screen may also require calibration if the cardiograph is used in different settings (seated instead of standing) or by users of significantly different height. The touch screen may need to be recalibrated to work optimally in the new setting or with the new user.

To calibrate the touch screen with the Force Calibration test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch the **Maintenance** tab.

- 3 Touch **Touch Calibration**.

- 4 Touch **Force Calibration**.

A white screen appears with a cross hair.

- 5 Touch the middle of the cross hair where the two lines intersect.

When the cross hair is touched it moves to a new location. Continue to touch the center of the cross hair.

NOTE If it takes several attempts to touch the center of the cross hair, press the ESC key (on keyboard) to close the screen. A Touch Calibration (diagnostic) test is required (see page 3-18).

- 6 Tap the screen to end the test; then touch **Done** to exit.

NOTE An error message *Test Calibration Test Failed* may appear if the Force Calibration test is performed without the Touch Calibration (diagnostic) test. The touch screen is calibrated. Touch **Close** to dismiss the message.

Cleaning the Touch Screen

The touch screen may require occasional cleaning.

To clean the touch screen

- 1 Dampen a soft cloth with water or with isopropyl alcohol.
- 2 Wring excess moisture from the cloth.
- 3 Wipe the touch screen area clean. Allow the touch screen to dry completely before use.

CAUTION Do not allow liquids to drip between the touch screen and the plastic display bezel.

Setting the Date and Time

The date and time that displays on the cardiograph may be changed at any time from the Configuration screen.

- NOTES**
- You can change also format of the displayed date (month/day/year) and time (12 hour or 24 hour) may be changed.
 - You must re-set the date and time when you change the batteries or press the Reset button.

To change the date and time

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Double-tap the displayed date and time on the upper right of screen.
The Please Select the Current Date, Time, and Time Zone window appears.
- 3 Touch a date on the calendar to select it, or touch the forward and back arrow buttons to scroll back or forward to the current month.
The selected date appears next to **Today:**.
- 4 Touch the displayed hour to highlight it. Type the correct hour.
- 5 Touch the displayed minute to highlight it. Type the correct minute(s) using the keyboard.
- 6 Select the correct time zone.
- 7 Touch the up or down arrow buttons, located to the left and right of the displayed time zone, to scroll through the available time zones. Or, touch the down-arrow button to display the drop-down list.
- 8 Touch **OK**.
The new date and time appears on the cardiograph in the upper right of the screen.

Maintaining the Floppy Disk and Disk Drives

To prevent floppy disk or disk drive damage, do the following:

- Do not expose floppy disks to direct sunlight, extremes of temperature or humidity, magnetic fields, or dust.
- Place floppy disks in a protective case and store floppy disks in a clean, dry place.
- Do not eject the floppy disk or turn off all power to the cardiograph when the disk drive is operating. The disk drive is operating when the green light on the drive is lit.
- Clean the floppy disk drive every six months with a wet-dry cleaning kit. Wet-dry cleaning kits are available from local computer stores.
- Clean the disk drive more often if the working environment is particularly dusty or dirty.

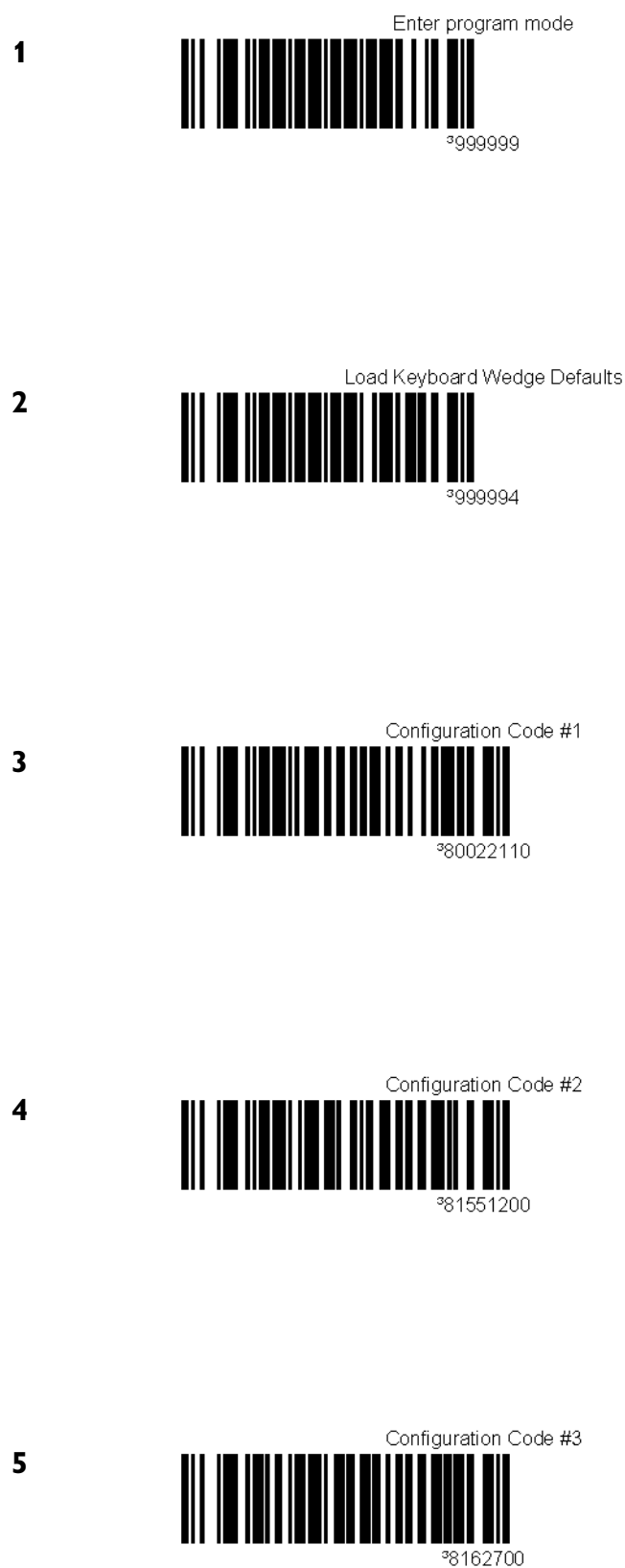
Configuring the Bar Code Reader

The optional bar code reader is shipped with configured settings that provide optimal use with the cardiograph. If the bar code reader operates with errors or missed data, perform the following configuration procedure on the bar code reader by scanning the sequence of bar codes in Figure 3-6.

The bar codes must be scanned in order from top to bottom in one session.

To calibrate the bar code reader

- 1 Hold the bar code scanner at a 45° angle and push the button (top of scanner).
- 2 Scan the bar code labeled 1 in Figure 3-6, “Bar code Calibration Sequence,” on page 3-15. The system emits three (3) beeps.
- 3 Scan the bar codes labeled 2-8 in Figure 3-6.
The system emits a single beep after each bar code is scanned.
After bar code 8 is scanned, the system emits three (3) beeps. Calibration is complete.
- 4 Perform the Bar Code test to verify performance. See page 4-13.

Figure 3-6 Bar code Calibration Sequence

6**7****8**

Maintenance Tests

Maintenance tests and diagnostic utilities are included in Configuration mode. These tests are used to verify or optimize cardiograph performance. They can be used as a first step in identifying a technical problem with the cardiograph. For more information about these tests, contact the nearest Philips Response Center (see page 1-18).

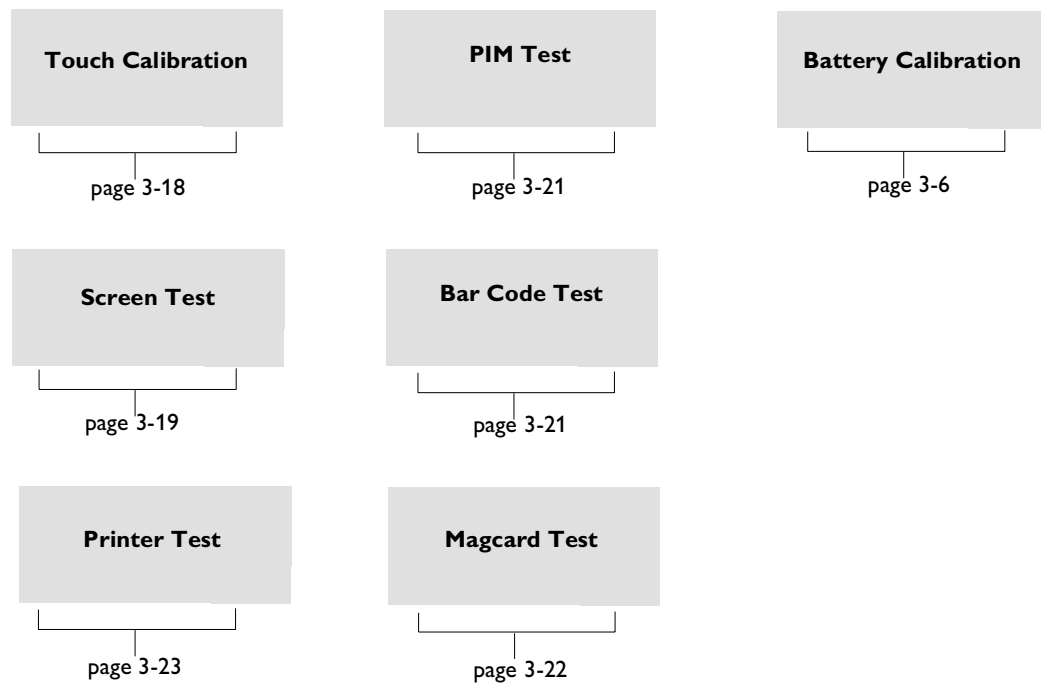
To open the Maintenance Test screen

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab.

The seven available tests appear on the screen.



Calibrating the Touch Screen

The Touch Calibration tests include:

- Force Calibration test. See page 3-12.
- Touch Calibration diagnostic test

Recommended use of these tests for maintenance and diagnostic purposes is described below.

Table 3-2 Touch Calibration Test Recommendations

Test	Recommended Use...
Force Calibration	<ul style="list-style-type: none"> ■ Perform this test first (see page 3-12) ■ Routine touch screen calibration when the cardiograph is used in a different setting (seated or standing) or by users of significantly different height ■ To improve overall touch screen performance when items on the touch screen are difficult to select
Touch Calibration (diagnostic)	<ul style="list-style-type: none"> ■ Perform this test second ■ When calibration is not improved after the Force Calibration test (that is, items are still difficult to select on the touch screen) ■ When the cross hairs on the Force Calibration screen are difficult to select ■ When the results of the touch screen calibration need to be reviewed by Philips Response Center representatives to identify a technical problem

To calibrate the touch screen with the Touch Calibration (diagnostic) test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab.
- 4 Touch **Touch Calibration**.
- 5 Touch **Start Test**.

A series of blue dots appear on the screen with cross hairs (middle of each circle).

- 6 Touch the center of each cross hair in each circle. A selected circle turns yellow.
Touch each circle on the screen.

- 7 When all circles are yellow, touch **Done**.
A message appears that the touch screen calibration failed or passed.
- 8 Touch **OK**.
If the message Touch Calibration Test Failed appears, contact the nearest Philips Response Center.

Screen Test

The Screen Test is used to verify the quality of the color displayed on the touch screen.

To perform the screen test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.

- 3 Touch the **Maintenance** tab.

- 4 Touch **Screen Test**.

A blank gray screen appears.

- 5 Touch **Color** at the lower left of the screen.

- 6 Touch **Pattern** on the bottom of the screen.

An image similar to that shown in Figure 3-7, “Screen Test Image,” on page 3-20 should appear.

NOTE The color gradations in the image on the cardiograph display will be more gradual and smoother than those shown in the figure here.

- 7 Look for the following details in the image appearing on the screen:
 - The progression of shading (from light to dark) in the red, green, and blue bars should be smooth and without breaks.
 - The gray lines (on top of color bars) should be straight and intersect the cross hairs at five points on the screen.

If the screen does not look similar to the image in Figure 3-7, the touch screen display failed the Screen test.

- 8 After examining the image, touch **Close**.

The Test Result Confirmation dialog appears.

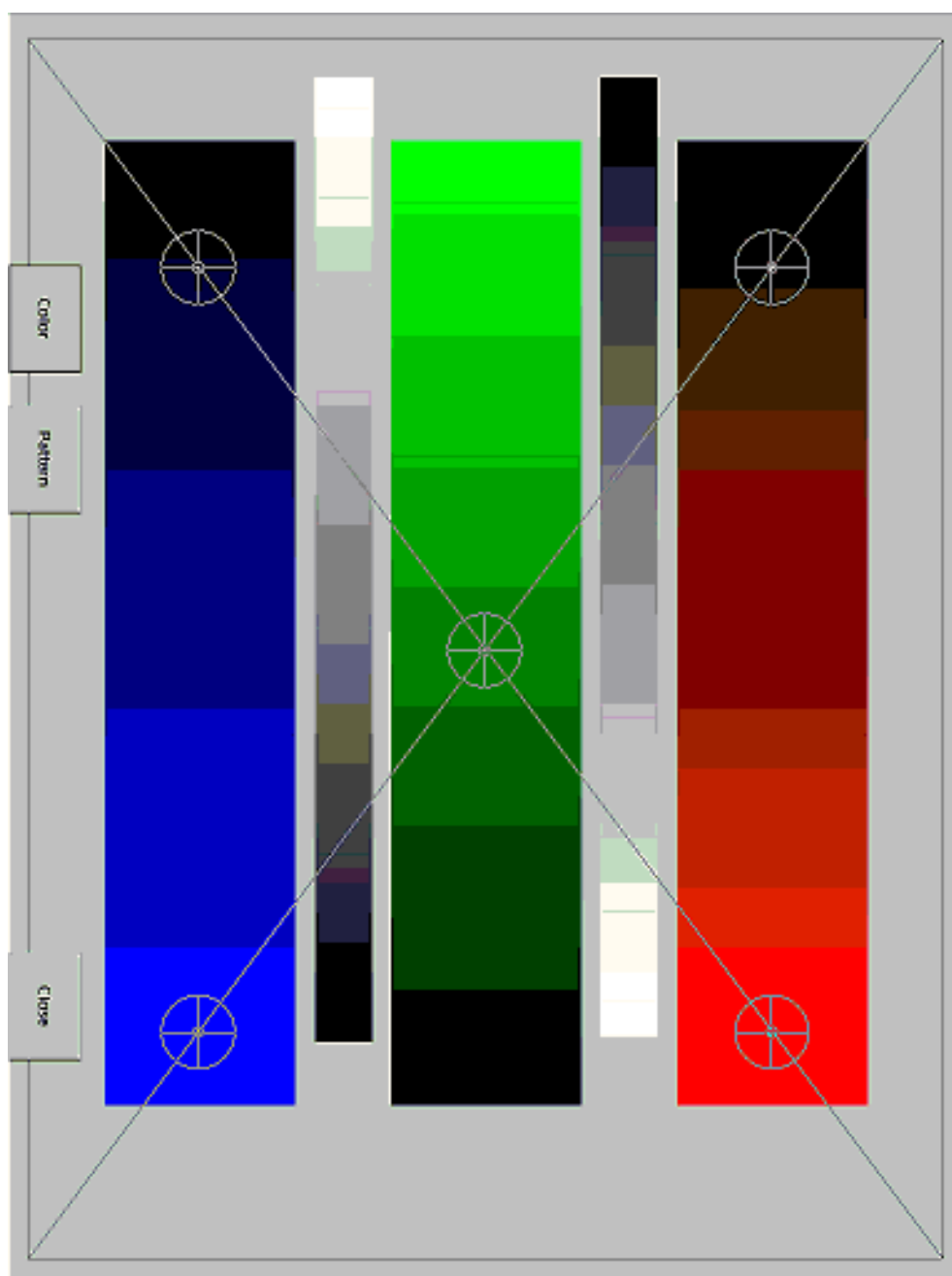
- 9 If the image on the screen is displayed correctly, touch **Yes**.

Touch **No** if the image on the screen did not display correctly.

A message appears confirming that the Screen test failed or passed.

- 10 Touch **OK**.

If the cardiograph failed the Screen test, contact the nearest Philips Response Center.

Figure 3-7 Screen Test Image

Patient Interface Module (PIM) Test

This test is used to confirm that the PIM is communicating with the cardiograph. This test can be performed when the cardiograph displays PIM error messages when the PIM patient data cable is securely attached to the RJ-11 receptacle on the right side of the cardiograph.

If this test fails, it may indicate a problem with the PIM or with the PIM data cable.

To perform the PIM test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab.
- 4 Touch **PIM Test**.

The PIM Test window appears with the message Accessing PIM.... The PIM Test results appear in the window.

- 5 Touch **OK**.

If the message PIM Test Passed appears, the PIM is communicating properly with the cardiograph.

If the message PIM Test Failed appears, contact the nearest Philips Response Center.

Bar Code Reader Test

The Bar Code Reader Test is used with the optional bar code reader (see page 1-13). The bar code reader is used to enter Patient ID information by scanning a bar code.

This test confirms if the bar code reader is accurately scanning bar code data.

To perform the bar code reader test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab.
- 4 Touch **Bar Code Test**.
The Bar Code Test window appears.
- 5 Hold the bar code reader at a 45° angle and scan the bar code.
The bar code data appears next to Bar Code Field.
- 6 Review the bar code data to ensure that it is correct.

- 7 Touch **Pass** if the bar code data displays correctly.
Touch **Fail** if the bar code data does not display correctly.
- 8 If the bar code reader fails the test, perform a bar code reader calibration and try the test again. See “Configuring the Bar Code Reader” on page 3-14.
If the bar code reader fails the test a second time, contact the nearest Philips Response Center.

Magnetic Card Reader Test

The Magnetic Card Reader Test is used with the optional magnetic card feature (see page 1-13). The magnetic card reader is used to enter Patient ID information.

This test confirms if the magnetic card reader is correctly reading data from the magnetic card.

To perform the Magnetic Reader Test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab.
- 4 Touch **Magcard Test**.
The Magcard Test window appears.
- 5 Insert the magnetic card into the slot on the front of the cardiograph with the magnetic stripe facing down, then remove it.
The magnetic card data appears next to **Magcard Track 1**.
- 6 Review the data to ensure that it is correct.
- 7 Touch **Pass** if the data is displayed correctly.
Touch **Fail** if the data is not displayed correctly.
- 8 If the magnetic card reader fails the test, try the test again.
If it fails a second time, contact the nearest Philips Response Center.

Printer Test

The Printer Test is used to verify that the cardiograph printer is able to correctly print the test page. Use this test to verify proper printer performance or when reports appear to have print quality errors.

To perform the Print test

- 1 Touch **Config** on the Command Toolbar.

NOTE Access to Configuration may be password controlled.

- 2 Touch **Defaults** on the Configuration Context Toolbar.
- 3 Touch the **Maintenance** tab (top of screen).

- 4 Touch **Printer Test**.

The Printer Test window appears with the message **Printing Test Page...** The printer test page prints.

- 5 Review the printer test page at points A, B, C, and D as seen in Figure 3-8, “Printer Test Page,” on page 3-24.

Table 3-3 Printer test page test points

Test Point	Description
A	The stepped bars are sharp edged and printed cleanly without distortion or missing segments
B	The spacing between the vertical lines is 25 mm with a discrepancy of no more or less than 2%
C	The diagonal lines should be straight and printed cleanly without distortion or breaks in the lines
D	The character set is printed cleanly without distortion or missing characters, and all characters are clearly legible

- 6 After reviewing the printer test page, touch **Yes** if the printer test page printed out correctly.

Touch **No** if the printer test page did not print out correctly.

If the printer fails the test, keep the printer test page and contact the nearest Philips Response Center.

A

B

C

D

```
Firmware build date: Jun 25 2003;
Speed: 25 mm/sec
#####
!#$%&'()*+,-./0
123456789:;<=>?@
ABCDEFGHIJKLMNPO
QRSTUVWXYZ[\]^_
`abcedefghijklmnop
qrstuvwxyz{|}~
#####
!@#%&'()*+,-./0
123456789:;<=>?@
ABCDEFGHIJKLMNPO
QRSTUVWXYZ[\]^_
`abcedefghijklmnop
qrstuvwxyz{|}~
#####
nooooo-stuntypy
```

Performance Verification and Safety Tests

This chapter describes the tests and inspections required to verify performance of the PageWriterTouch cardiograph following a service event.

This chapter provides the following information:

Required Testing Levels	4-1
External Repairs	4-1
Internal Repairs	4-2
Upgrades	4-2
Test and Inspection Matrix	4-3
Test Equipment	4-5
Performance Verification Tests	4-5

Required Testing Levels

The Performance Verification Tests verifies proper operation of the PageWriterTouch following a service event. The level of testing required corresponds to the type of service performed.

NOTE Installation and Preventive Maintenance are not considered service events since the cardiograph is designed to be installed and maintained by the user. Service Events are divided into two categories: Repairs and Upgrades. Repairs are then further divided into External repairs and Internal repairs.

External Repairs

External repairs consist of repairs or replacements of one or more items. Repair or replacement of these items does not require you to open the cardiograph case, therefore only a limited number of tests are necessary to verify performance post-repair. External repairs that involve the PIM, PIM data cable, and PIM lead set require an ECG simulation test to verify proper ECG signal path.

The typical external repairs include:

- PIM
- Patient Leads
- PIM data cable

- Labels
- Batteries
- Paper Tray
- AC Power Cord
- Main Fuse (in Power Entry Assy)
- PCMCIA card
- PCMCIA modem
- Bar Code reader
- Cart (Trolley)
- External cables

Refer to Table 4-1 for the required test blocks that must be performed after any external repair occurs.

Internal Repairs

If the case was opened, regardless of the repair, you must perform additional Performance Verification Tests. Refer to Table 4-1 for the required test blocks that must be performed after any internal repair.

Upgrades

Most PageWriterTouch upgrades are installed by the user, and are not considered service events. The only exceptions are upgrades for the software and the Magnetic Card Reader. Refer to Table 4-1 for the required test blocks that must be performed after these upgrades.

Table 4-1 Tests Required

Service Event		Test Blocks Required
Repairs	External Repairs not involving the patient module, e.g. battery, fuse, labels, cart, etc....	Perform Visual Inspection, Power On test, and functional tests specific to components repaired
	External repairs where the cardiograph case is not opened, but involving the patient module, patient lead set, or patient data cable	Perform Visual Inspection, Power On test, ECG simulation test, and functional tests specific to components repaired
	Internal repairs where the cardiograph case is opened.	Perform Visual Inspection, Power On test, ECG simulation, safety tests S1, S2, and S3, plus functional tests specific to components repaired

Table 4-1 Tests Required *(continued)*

Service Event		Test Blocks Required
Upgrades	Software Upgrades (via external PCMCIA slot)	Perform Power On test
	Magnetic Card Reader Upgrade	Perform Visual Inspection, Power On test, ECG simulation, safety tests S1, S2, and S3, plus functional tests specific to components repaired

Test and Inspection Matrix

The following Test and Inspection Matrix describes the various test blocks, expected test results, and what you need to document on the service record.

Table 4-2 Test and Inspection Matrix

Test Block Name	Test or Inspection” to Perform	Expected (Passing) Test Results	What to Record on a Service Record
Visual Inspection (V)	Perform visual inspection.	If there is no apparent wear, damage, or corrosion the visual inspection passes	V:P (pass) V:F (fail)
Power On (PO)	Power on the unit. Watch display for error codes. See Chapter 5, “Diagnostics and Troubleshooting” for a list of codes.	If the display shows the PageWriterTouch splash screen followed by the R/T ECG screen, the Power On test passes.	PO:P (pass) PO:F (fail)
Individual Functional Tests	From within Service Mode, the following tests can be run.		
Printer Test (P)	Perform Printer Test. See “Printer Test” on page 3-23.	As described in the test procedure	P:P (pass) P:F (fail)
Floppy Disk Drive Test (FDD)	Perform Floppy Drive Test. See “Floppy Drive Test (FD)” on page 4-10.	If the message “FDD Test Completed. Media Size [x] bytes. No Error” appears, where [x] is approximately 140000, the Floppy Disk Drive test passes.	FDD:P (pass) FDD:F (fail)

Table 4-2 Test and Inspection Matrix *(continued)*

Test Block Name	Test or Inspection” to Perform	Expected (Passing) Test Results	What to Record on a Service Record
Touch Screen Display Test (TD)	Perform the Touch Screen and Screen Image tests. See “Calibrating the Touch Screen” on page 3-12 and “Screen Test” on page 3-19.	As described in the test procedure.	TD:P (pass) TD:F (fail)
Keyboard Test (K)	Perform the Keyboard test. See “Keyboard Test (K)” on page 4-12.	As described in the test procedure.	K:P (pass) K:F (fail)
Modem Test (M)	Perform the Modem Test. See “Modem Test (M)” on page 4-13.	As described in the test procedure.	M:P (pass) M:F (fail)
PC Card Test (PCC)	Perform the PC Card Test. See “PC Card Test (PCC)” on page 4-13.	If the message “0001 PC Card Test completed. Media Size [x] bytes. No Error” appears, and [x] is the correct media size, then the PCC test passes.	PCC:P (pass) PCC:F (fail)
Bar Code Reader Test (BR)	Perform the Bar Code Test. See “Bar Code Reader Test” on page 3-21.	As described in the test procedure.	BR:P (pass) BR:F (fail)
Magnetic Card Reader Test (MCR)	Perform the Magnetic Card Reader Test. See “Magnetic Card Reader Test” on page 3-22.	As described in the test procedure.	MCR:P (pass) MCR:F (fail)
ECG Simulation (ECG)	Connect a 12 Lead Patient Simulator to the lead set and print a 12 lead ECG. Visually analyze the printout.	If there is trace activity in all 12 leads with no notable distortion or noise, and cal pulses of proper duration and amplitude, then the ECG Simulation passes	ECG:P (pass) ECG:F (fail)

Table 4-2 Test and Inspection Matrix *(continued)*

Test Block Name	Test or Inspection” to Perform	Expected (Passing) Test Results	What to Record on a Service Record
Safety (S1)	<ul style="list-style-type: none"> Earth leakage current NC (normal condition) Earth leakage current SF (Single Fault) 	NC Maximum leakage current $\leq 300 \mu\text{A}$ (UL) $\leq 500 \mu\text{A}$ (IEC) x1 SF Maximum leakage current $\leq 1000 \mu\text{A}$ x2	Example: S1:P/100/200
Safety (S2)	Protective earth resistance	Maximum impedance $\leq 200 \text{ milli } \Omega$ x1	Example: S2:P/100
Safety (S3)	Leads leakage current <ul style="list-style-type: none"> Source (Normal condition) Source (Single Fault condition) With Mains on applied part (Single Fault Condition) 	$\leq 10 \mu\text{A}$ x1 $\leq 50 \mu\text{A}$ x2 $\leq 50 \mu\text{A}$ x3	Example: S3:P/5/20/20

Test Equipment

The following test equipment is required to perform the complete set of Performance Verification tests:

- ECG Simulator
- Electrical Safety Tester
- Software Support Kit (CF Card with PCMCIA Adapter). Order part number 453563479701 through your Philips authorized service parts supplier.

Performance Verification Tests

Visual Inspection (V)

Before beginning the inspection, press the On/Standby button to put the cardiograph in Standby mode, and unplug the power cord from the wall outlet. Inspect the cardiograph external surfaces for the following:

- Worn or damaged power cord
- Loose or missing hardware
- Mechanical damage

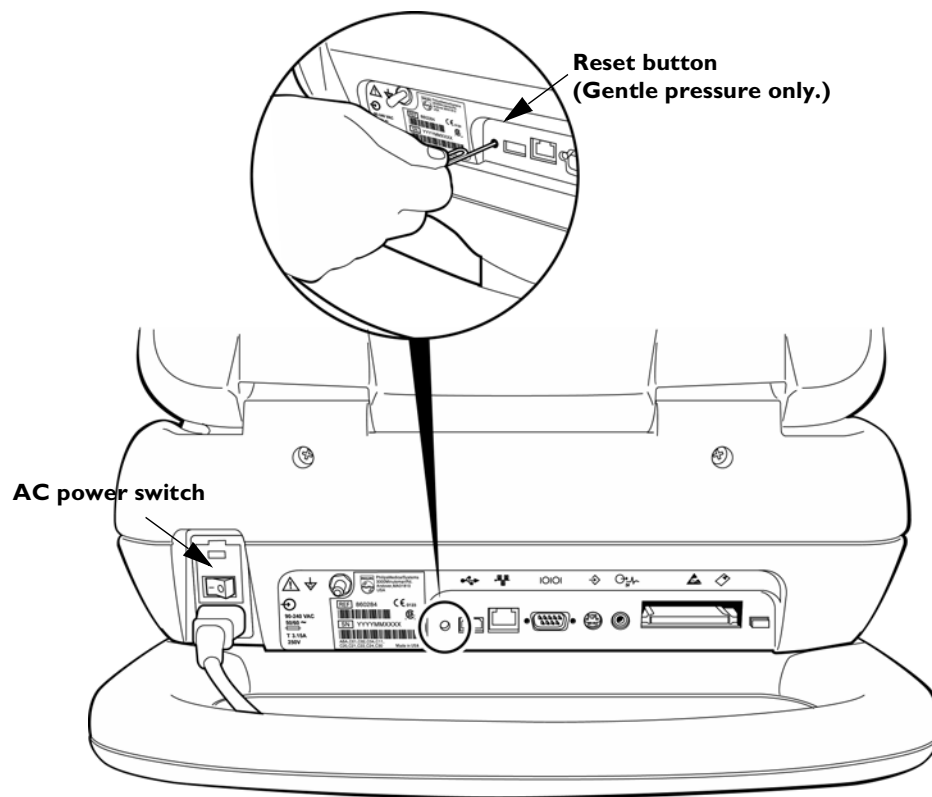
- Evidence of liquid spill
- Worn printer drive gear
- Worn printer roller
- Corroded or damaged reusable electrodes, if present
- Damaged patient leads
- Dirt/paper residue on the thermal print head
- Frayed or damaged wiring
- Visible touch screen damage
- Replace any damaged or missing items.
- Clean the and patient leads as necessary. Cleaning instructions are listed in the Cardiograph Care and Maintenance chapter of the PageWriterTouch Instructions For Use.

Power On Test

To process a completed Power On test, you must completely reboot the cardiograph. Make sure to place the cardiograph in Standby mode before you reboot.

To reboot the cardiograph

- 1 Press the On/Standby button to put the cardiograph in Standby mode
- 2 Using a pencil or other item with a small tip, gently press the Reset button located next to the USB port in the back of the cardiograph. Wait approximately 40 seconds for the cardiograph to reboot.

Figure 4-1 Rebooting the Cardiograph**If the cardiograph does not reboot**

- 1 Turn the AC power switch to the Off position.
Check that the AC power indicator light (front of the cardiograph) is not lit.
- 2 Open the battery door and remove both batteries.
- 3 Wait 30 seconds, then insert both batteries at the same time.
- 4 Turn the AC power switch to the On position.
A successful reboot displays the PageWriterTouch splash screen, followed by the R/T (RealTime) ECG screen. If an error code displays during power on, the reboot test failed.

The following self-tests are automatically performed during reboot:

- RAM
- Software CRC Test
- Flash Memory: onboard CompactFlash (CF) and internal CompactFlash (CF)
- PIM Status
- PCMCIA Detect
- AVL/Battery Voltage Test

Individual Functional Tests

You perform the following tests using the Service Utility. For detailed procedures on some of these tests, see Chapter 5, “Diagnostics and Troubleshooting.”

Some tests are also available using the User Maintenance tab. In general, the tests described in Chapter 3, “Cardiograph Care and Maintenance” of this guide use this approach.

For additional details, also refer to the Cardiograph Care and Maintenance chapter of the *PageWriterTouch Cardiograph Instructions for Use*.

Accessing the Service Utility

To launch the Service Utility

- 1 Place the cardiograph in Standby mode.

NOTE Entering the Service Utility will require full reboot of cardiograph. Any unsaved patient data will be lost.

- 2 Perform a soft reset by gently pressing the Reset button adjacent to the USB connector on the rear panel of the cardiograph.

After approximately 40 seconds, the PageWriterTouch Splash screen appears, followed by an audible beep.



- 3 Quickly, while the splash screen is displayed, hold down the left *CTRL* and *SHIFT* keys together and tap the touch screen.

NOTE The splash screen disappears after five seconds, so if you miss it, you must reset the cardiograph again.

An Access Code window appears. If the Access Code window does not appear, try the left *CTRL-SHIFT-touch* sequence again.

- 4 Type the access code.

The factory default code is “0000”.

The Service Utility screen appears. See Figure 4-2 on the following page.

Figure 4-2 Service Utility Screen

PageWriter Touch Service Utility v. A.01.20

Revisions Kernel Rev: K.02.24.EMU Application Rev: X.01.00.35GW.EN PIM Kernel Rev: D.010 PIM Kernel CRC: F433186E PIM Boot Rev: 1.008 PIM Boot CRC: C398FCBE Printer SW Date: Jun 25 2003;	Device Status PIM Status: Present, CH:12, No Flags Printer Status: OK Total Pages Printed: 117 Installed Options: Debug Port: Ext DB9 Change Debug Port	Diagnostic Tests Touchscreen <input type="checkbox"/> Repeat Count: 0 Tester Info: Start Stop Clear Results Print Cumulative Results
Storage RAM (MB/Load): 49 (19%) Archive Storage (Free/Total): 81.0MB /124.8MB PCMCIA Storage (Free/Total): <not found>	Battery Info Battery Status: 0x00E0,0x00E0 Temp (degC): 23.94,27.14 Voltage (mV): 12441,12353 Expected Max Error (%): 2,3 Remaining Capacity Total (mAh): 5980,6051 Full Charge Capacity (mAh): 6441,6624 Percent Full (%): 92,91 Run Time to Empty (min): 65535,65535 Charge Current (mA): 0,0 Cycle Count: 7,6	Software Installation Utility View Logs Change Access Code Calibrate Batteries Refresh Print Status Restart Unit
Network MAC Address: 00-60-0C-00-3F-78 IP Address: 161.88.29.111	AVR Statistics AVR Rev: T:8535 V:2003 R:K +3.4V Reg: 3.485 +5.0V Reg: 5.023 +12V Reg: 13.801 2.5V Load: 2.563	

For detailed information about the components of this screen, see “Using the Service Utility” on page 5-2.

Printer Test (P)

To test the printer

- From the Service Utility, select **Printer Test** from the pull-down list.
The Printer Test window appears with the message Printing Test Page.... The printer test page prints
- Perform steps 5 to 6 of “To perform the Print test” on page 3-23.

Floppy Drive Test (FD)

The floppy drive test writes and reads from a diskette inserted in the drive. Insert a diskette before you start the test, and verify that the diskette is not write protected.

To test the drive

- 1 Insert a blank diskette in the cardiograph drive.
- 2 From the Service Utility, select **Floppy Drive Test** from the pull-down list, and touch **Start**.

If the drive test fails, the message 0001 FDD Test Failed appears on the screen.

Touch Screen Display Test (TD)

The touch screen display test consists of two separate tests:

- Touch calibration
- Screen test

Complete these tests to verify proper touch screen display performance after repair or replacement of the display assembly.

Touch Calibration

The Touch Calibration tests include: Force Calibration and the Touch Calibration (diagnostic) test. Recommended use of these tests for maintenance and diagnostic purposes is described below.

Table 4-3 Touch Calibration Test Recommendations

Test	Recommended Use...
Force Calibration	<ul style="list-style-type: none"> ■ Perform this test first ■ Routine touch screen calibration when the cardiograph is used in a different setting (seated or standing) or by users of significantly different height ■ To improve overall touch screen performance when items on the touch screen are difficult to select

Table 4-3 Touch Calibration Test Recommendations *(continued)*

Test	Recommended Use...
Touch Calibration (diagnostic)	<ul style="list-style-type: none"> ■ Perform this test second ■ When calibration is not improved after the Force Calibration test (items are still difficult to select on the touch screen) ■ When the cross hairs on the Force Calibration screen are difficult to select ■ When the results of the touch screen calibration need to be reviewed by Philips Response Center representatives to identify a technical problem

To calibrate the touch screen with the Force Calibration (diagnostic) test

- 1 From the Service Utility, select **Screen Test** from the pull-down menu.
- 2 Touch **Force Calibration**.
A white screen appears with a cross hair.
- 3 Perform steps 5 to 6 of “To calibrate the touch screen with the Force Calibration test” on page 3-12.

To calibrate the touch screen with the Touch Calibration (diagnostic) test

- 1 From the Service Utility, select **Screen Test** from the pull-down menu.
- 2 Touch **Touch Calibration**.
- 3 Perform steps 5 to 8 of “To calibrate the touch screen with the Touch Calibration (diagnostic) test” on page 3-18.

Screen Test

The Screen Test is used to verify the quality of the color displayed on the touch screen.

To perform the screen test

- 1 From the Service Utility, select **Screen Test** from the pull-down menu.
- 2 Touch **Screen Test**.
A blank gray screen appears.
- 3 Perform steps 5 to 10 of “Screen Test” on page 3-19.

PIM Test

This test is used to confirm that the Patient Interface Module (PIM) is communicating with the cardiograph. This test can be performed when the cardiograph displays Patient Interface Module error messages when the PIM patient data cable is securely attached to the RJ-11 receptacle on the right side of the cardiograph.

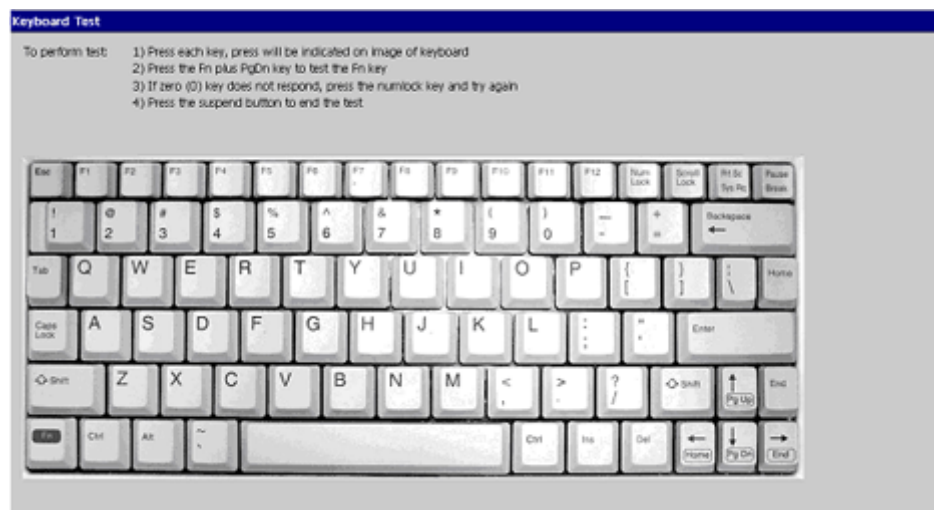
To perform the PIM test

- 1 From the Service Utility, select **PIM Test** from the pull-down menu.
The PIM Test window appears with the message **Accessing PIM....** The PIM Test results appear in the window.
- 2 Touch **OK**.
If the message **PIM Test Passed** appears, the PIM is communicating properly with the cardiograph.
If the message **PIM Test Failed** appears, it may indicate a problem with the PIM or with the PIM data cable. Contact the nearest Philips Response Center (see page 1-18).

Keyboard Test (K)

To test the keyboard

- 1 From the Service Utility, select **Keyboard** from the pull-down list, then touch **Start**.
The Keyboard Test window appears.



- 2 Press each key on the keyboard.
If a key is highlighted, the key is registered.
- 3 Follow the instructions on the screen to test the FN or ALT keys.
- 4 After all keys are highlighted, select **Done**.
- 5 Select **Close**.
The test is not successful if one or more keys is not recognized when you press them.

Modem Test (M)

To test the modem

- 1 Insert an approved CompactFlash (CF) card in the slot located in the back of the cardiograph.
- 2 From the Service Utility, select **Fax/Modem Test** from the pull-down list, then touch **Start**.

The Modem test performs the following checks to verify if the modem is compatible with the cardiograph:

- Modem recognition
- ROM and Firmware verification

The test is not successful if the modem is not properly recognized, or if the ROM or firmware verification fails.

PC Card Test (PCC)

To perform the PC card test

- 1 Insert a blank PCMCIA or CF card with PCMCIA adapter in the PCMCIA slot located in the back of the cardiograph.
- 2 From the Service Utility, select **PC Card Test** from the pull-down list, then touch **Start**.

The cardiograph will detect and report the media size of the card. If the test fails, the message PC Card Test failed appears.

Bar Code Reader Test (BR)

The Bar Code Reader test is used with the optional bar code reader. The bar code reader is used to enter Patient ID information by scanning a bar code.

This test can be used to confirm that the bar code reader is accurately scanning bar code data.

For details on performing the test, see “Bar Code Reader Test” on page 3-21. For details on calibrating the bar code reader, see “Configuring the Bar Code Reader” on page 3-14.

To test the bar code reader

- 1 Plug the optional bar code scanner into the associated proper port located on the back of the cardiograph.
- 2 From the Service Utility, select **Bar Code Reader** from the pull-down list, then touch **Start**.

The cardiograph prompts the user to scan a test barcode pattern - any barcode can be used for this test.

- 3 Perform steps 5 to 8 of “Bar Code Reader Test” on page 3-21.
- 4 Compare the text displayed on the screen to the actual text beneath the barcode.
A failed test is one in which the displayed text does not match the actual barcode.

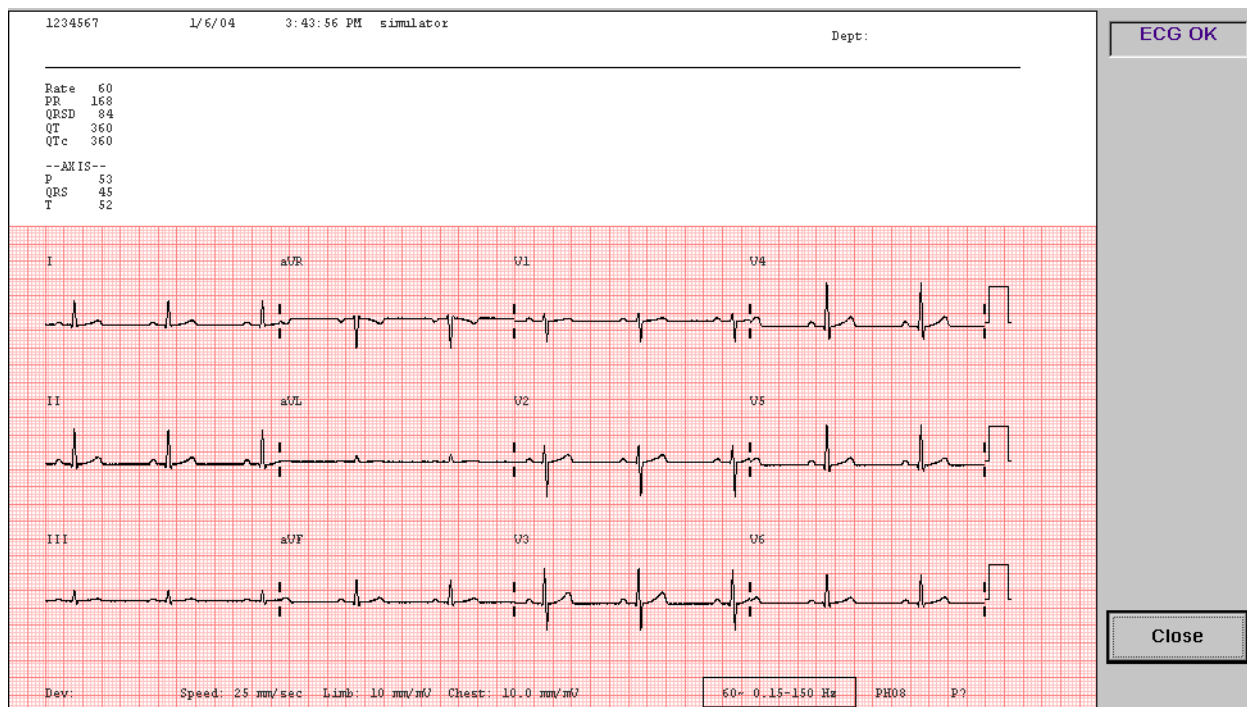
ECG Simulation (ECG)

Taking an ECG using a 12-lead ECG simulator allows you to verify areas of operation that the extended self-test cannot check:

- Integrity of the patient leads
- Accuracy of the paper speed (not available on all simulators)
- Accuracy of the gain settings (not available on all simulators)

The recorded ECG trace should look similar to the one shown in the following figure. Trace differences may result from differences in simulators, simulator settings, and from differences in configuration and control settings on the cardiograph.

Figure 4-3 Simulated 12-Lead ECG



To make a simulated ECG recording


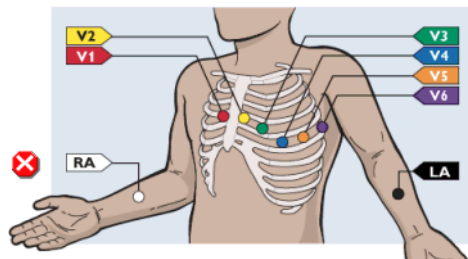
- 1 Connect the PIM lead wires to the simulator.
- 2 Touch **R/T ECG** (Realtime ECG mode) on the touch screen.
Verify that all lead wires are connected by observing the display for flat lines.
- 3 Firmly pull each lead wire tight, and then look for excessive noise on the display (may be indicated by yellow or orange waveforms).
Check the leads map to be sure that an  does not appear next to any electrodes.

Figure 4-4 Lead Off Symbol (Red X)

- 4 Touch **Auto**, then **Continue** to start an AUTO 12-Lead recording.
Depending on the cardiograph's configuration, the ECG may be printed automatically at this point, or it may only be previewed on the display.
- 5 Verify that **ECG OK** appears at the top right of the preview screen.
If the ECG is not printed automatically then touch the Print button to initiate the printing.
Verify the following when printing is complete:
 - Trace activity for all 12 leads. Confirms integrity for all patient electrodes and leadwires. Noise should measure less than one (1) mm, with no baseline wander.
 - No gross distortion of complexes or calibration pulses (no overshoot and so forth).
 - Duration for calibration pulses for correct paper speed. With cardiograph set to record at 25 mm/sec, the calibration pulse should measure 5mm (calibration pulse duration is 200 ms).
 - Calibration pulse amplitude is correct.

- NOTES**
- An arrhythmia simulator is not an acceptable tool for verifying computerized ECG analysis. The analysis software is biased to process human ECG data.
 - Noise may be an artifact of poor connections to the simulator or position of the cables. If noise appears, check the connectors or adjust the cable drape.

Safety Test

This section covers tests of the cardiograph's electrical safety.

Test Notes

- Use the procedures called out by the manufacturer of the safety analyzer in use.
- Test both Normal and Reverse polarity line connections for each test, and record the worst-case value.
- If a ground reference point is needed for the testing, use the metal grounding stud on the back of the cardiograph.

Safety Test S1 - Earth Leakage

To check for leaks in the ground wire for the AC power cord.

- Normal Condition with both AC line connections intact:
 - $\leq 300 \mu\text{A}$ (UL, 120 VAC)
 - $\leq 500 \mu\text{A}$ (IEC, 240 VAC)
- Single Fault Condition with one AC line connection open:
 $\leq 1000 \mu\text{A}$

Safety Test S2 - Protective Earth Resistance

Impedance of protective earth ground:

$$\leq 200 \text{ milli}\Omega$$

Safety Test S3 - Leads Leakage Current

Leakage from Source or into Sink patient leads (Applied Parts)

- Source
 - Normal Condition with both AC line connections and earth ground intact:
 $\leq 10 \mu\text{A}$
 - Single Fault Condition with separate open neutral and open earth, each in turn:
 $\leq 50 \mu\text{A}$
- Sink

Single Fault Condition with AC Mains voltage on Applied Parts (both AC line connections and earth ground intact).

 $\leq 50 \mu\text{A}$

Diagnostics and Troubleshooting

This chapter provides information for localizing cardiograph problems to the subassembly level. This information is designed for use with the cardiograph's diagnostic self-tests to help you efficiently repair the cardiograph with a minimum of equipment.

This chapter provides the following information:

Repair Philosophy	5-1
Using the Service Utility	5-2
Accessing the Windows CE Desktop	5-15
DC Voltage Test Points	5-16
Power On Sequence.	5-17
Troubleshooting Cardiograph Issues.	5-18

Repair Philosophy

The repair philosophy for the cardiograph is subassembly replacement. Examples of subassemblies are the Patient Interface Module (PIM), the Main Control Board (PCA), the batteries, and the display and touch screen assembly. Repairs that involve replacing components on a PCA are not supported.

Replaceable subassemblies are identified in Appendix A, "Cardiograph Subassembly Views." For details about the required test equipment, see "Test Equipment" on page 4-5.

For details about ordering supplies, see "Supplies and Ordering Information" on page 1-14.

CAUTION	Individual component replacement should not be attempted outside of a factory authorized repair facility. Component level repair is extremely difficult due to the extensive use of surface mount technology and the high parts density on the circuit boards. Unauthorized component replacement can impair cardiograph performance.
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Using the Service Utility

The Service Utility screen displays important information and statistics about the cardiograph and is a valuable diagnostic tool when troubleshooting the cardiograph.

Using the Service utility, you can:

- Check important unit status
- Check the current software revisions
- Upload new software
- Check the amount of ECG storage remaining
- Confirm DC voltages
- Examine battery statistics
- Run diagnostic tests
- Extract system log files
- Print a unit status report

Launching the Service Utility

For details about launching the Service Utility, see “Accessing the Service Utility” on page 4-8.

Service Utility Interface Components

The following sections provide a detailed description of the various components of the Service Utility interface.

Figure 5-5 Service Utility Screen

PageWriter Touch Service Utility v. A.01.20

Revisions Kernel Rev: X.02.24.ENU Application Rev: X.01.00.35GW.EN PIM Kernel Rev: D.010 PIM Kernel CRC: F4331B6E PIM Boot Rev: 1.008 PIM Boot CRC: C398FCBE Printer SW Date: Jun 25 2003;	Device Status PIM Status: Present, CH:12, No Flags Printer Status: OK Total Pages Printed: 117 Installed Options: Debug Port: Ext D69 Change Debug Port	Diagnostic Tests Touchscreen <input type="checkbox"/> Repeat Count: 0 Clear Results Tester Info: Start Stop Print Cumulative Results
Storage RAM (MB/Load): 49 [19%] Archive Storage (Free/Total): 81.0MB /124.8MB PCMCIA Storage (Free/Total): <not found>	Battery Info Battery Status: 0x00E0,0x00E0 Temp (degC): 23.94,27.14 Voltage (mV): 12441,12353 Expected Max Error (%): 2.3 Remaining Capacity Total (mAh): 5980,6051 Full Charge Capacity (mAh): 6441,6624 Percent Full (%): 92.91 Run Time to Empty (min): 65535,65535 Charge Current (mA): 0.0 Cycle Count: 7.6	Software Installation Utility View Logs Change Access Code Calibrate Batteries Refresh Print Status Restart Unit
Network MAC Address: 00-60-0C-00-3F-78 IP Address: 161.88.29.111	AVR Statistics AVR Rev: T.8535 V:2003 R:K +3.4V Reg: 3.486 +5.0V Reg: 5.023 +12V Reg: 13.801 2.5V Load: 2.563	

Revisions

Revisions	
Kernel Rev:	K.02.24.ENU
Application Rev:	X.01.00.35GW.EN
PIM Kernel Rev:	D.010
PIM Kernel CRC:	F4331B6E
PIM Boot Rev:	1.008
PIM Boot CRC:	C398FCBE
Printer SW Date:	Jun 25 2003;

Kernel Rev: Otherwise known as the main board OS. The Kernel is the compressed Windows CE 3.0 image plus support files required by the main board for normal system operation. The kernel is localized; different languages may have different kernels. The kernel localization is indicated after the revision.

ENU = English

Application Rev: The application software consists of executable and data files which comprise the PageWriterTouch cardiograph application. The application software is localized, therefore a different image exists for each language.

PIM Kernel Rev: The Patient Interface Module (PIM) is loaded with a separate kernel which enables it to interact with the cardiograph and perform patient data acquisition tasks. Not localized.

PIM Kernel CRC: The PIM Kernel CRC is checked each time the cardiograph awakes from Standby, thereby verifying that the PIM kernel software is appropriate. The PIM kernel is not localized.

PIM Boot Rev: The PIM Boot revision is checked each time the cardiograph awakes from Standby.

PIM Boot CRC: The PIM Boot CRC is checked each time the cardiograph awakes from Standby, thereby verifying that the PIM Boot software is appropriate. The PIM boot software is not localized.

Printer SW Date: The printer control board software date. The printer software is not localized.

Storage

Storage	
RAM (MB/Load):	49 [19%]
Archive Storage (Free/Total):	81.0MB /124.8MB
PCMCIA Storage (Free/Total):	<not found>

RAM (MB/Load): Shows actual RAM usage in MB and as a percentage of total available (in MB synchronous DRAM). Totals greater than 50% indicate a problem.

Archive Storage (Free/Total): Shows available memory for ECG Archive Storage. The number of ECGs stored in the internal archive is intentionally limited to 150 to preserve system performance. Available free storage must be greater than 20MB, with 120 MB to 128MB as an acceptable range for total storage.

PCMCIA Storage (Free/Total): Shows available memory for ECG Storage on external PCMCIA card (if installed). Note: The number of ECGs which can be stored on the external PCMCIA card is intentionally limited to 100 in order to preserve system performance. The total storage varies with PCMCIA card.

Network

Network	
MAC Address:	00-60-0C-00-3F-78
IP Address:	161.88.29.111

MAC Address: Unique identifier associated with Ethernet chip on the Main Board which is sometimes required for networking.

IP Address: Network IP Address which can be configured from the Configuration screen. See the PageWriterTouch IFU for further information.

AVR Statistics

AVR Statistics	
AVR Rev:	T:8535 V:2003 R:K
+3.4V Reg:	3.486
+5.0V Reg:	5.023
+12V Reg:	13.801
2.5V Load:	2.563

AVR Rev: The firmware revision of the AVR Power Controller.

+3.4V Reg: Output of the U22 regulator. The acceptable range is 3.06 V to 3.74 V.

+5.0V Reg: Output of the U19 circuit. Otherwise known as VCC. Acceptable range is 4.5V to 5.5V.

+12V Reg: Output of the U48 circuit, supplies voltage to the display backlight. Acceptable range is 10.8 V to 13.2 V.

2.5V Load: Output from the U17 regulator. Acceptable range is 2.25 V to 2.75 V.

Device Status

Device Status	
PIM Status:	Present, CH:12, No Flags
Printer Status:	OK
Total Pages Printed:	117
Installed Options:	
Debug Port:	Ext DB9
Change Debug Port	

PIM Status: Reports whether the cardiograph and Patient Interface Module (PIM) are communicating properly. Normal status is “Present, CH:12, No Flags”

Printer Status: Reports the status of the printer control board. Normal status is “OK”

Total Pages Printed: This is a counter which records the number of pages printed by the thermal printer. This number is only approximate, because partially printed pages and form feeds may not be counted. This counter is reset whenever the system software (application/kernel/printer) is reloaded.

Installed Options: Not currently in use.

Debug Port: For factory use only.

Change Debug Port: For factory use only.

Battery Info

Battery statistics are shown for each battery separated by a comma – “Battery A, Battery B” where Battery A is the battery installed toward the front of the cardiograph (closest to the operator).

Battery Info

Battery Status: 0x00E0,0x00E0

Temp (degC): 23,94,27,14

Voltage (mV): 12441,12353

Expected Max Error (%): 2,3

Remaining Capacity Total (mAh): 5980,6051

Full Charge Capacity (mAh): 6441,6624

Percent Full (%): 92,91

Run Time to Empty (min): 65535,65535

Charge Current (mA): 0,0

Cycle Count: 7,6

Battery Status Hex code for the last updated status of the battery. The following are typical status values:

0x0080	Charging
0x00C0	Not charging
0x0020	Fully charged
0x00E0	Fully charged and not charging
0x00A0	Fully charged and charging
0x00C0	Partially charged and not charging
0x0080	Partially charged and charging
0x00D0	Fully discharged and not charging
0x0090	Fully discharged and charging

Temp (deg C): Battery internal temperature in degrees Celsius. If the temperature elevates above 80 degrees, an alarm sounds.

Voltage (mV): The last updated voltage reading of each battery displayed in mV. This voltage reading is typically between 8000 mV and 12600 mV for an installed battery.

Expected Max Error (%): A measure of how accurately (or inaccurately) the battery fuel gauge is currently operating. Over time the accuracy of the fuel gauge will decrease because of the effects of time, temperature, and usage patterns for charge and discharge rates. The error range is from 0 to 10%.

Remaining Capacity Total (mAh): The predicted remaining capacity of the battery. This value is based upon the real-time measured current flow in or out of the battery.

Full Charge Capacity (mAH): The predicted battery capacity when fully charged. This value is determined when the battery is calibrated.

Percent Full (%): The predicted remaining battery capacity expressed as a percentage of Full Charge Capacity.

Percent Full (%) = Remaining Capacity Total (mAH)/Full Charge Capacity (mAH)

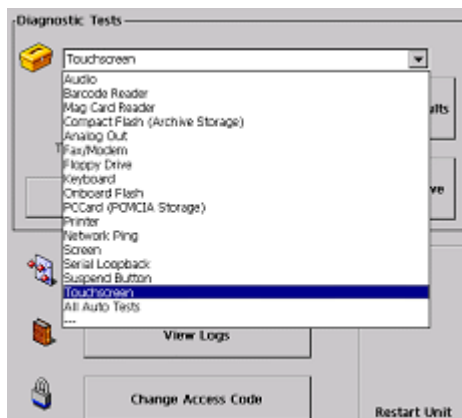
Run Time to Empty (min): The predicted remaining battery life at the present rate of discharge.

Charge Current (mA): The battery's desired charging rate.

Cycle Count: The number of complete charge/discharge cycles the battery has experienced.

Diagnostic Tests Available in the Service Utility

The following tests are available on the pull-down menu. Select the desired test using the Up and Down arrows on the keyboard, or by touch screen selection. Touch the **Start** button to start the test.



Audio

Tests whether the cardiograph is emitting sounds.

To test audio

- 1 From within Service Mode, select **Audio** from the pull down list, and touch **Start**.
The test emits an audible beeping tone.
- 2 Touch **Stop** to stop the tone.
The Test Result Confirmation dialog box appears confirming that you heard the tones.
The result is stored in the Cumulative Results section.

Barcode Reader

In order to properly perform the Barcode Reader Test, the optional barcode scanner must be plugged into the proper port on the back of the cardiograph.

To test the barcode reader

- 1 From within Service Mode, select **Barcode Reader** from the pull down list, and touch **Start**.

The Barcode Test window appears.

- 2 Follow steps 5 to 8 as described in “Bar Code Reader Test” on page 3-21.

The result is stored in the Cumulative Results section.

Mag Card Reader

Verifies that the magnetic card reader is working properly. The optional Mag Card Reader option must be installed.

To test the magnetic card reader

- 1 From within the Service Utility, select **Mag Card Reader** from the pull-down list, and touch **Start**.

- 2 Follow steps 5 to 8 as described in “Magnetic Card Reader Test” on page 3-22.

The result is stored in the Cumulative Results section.

CompactFlash (CF) (Archive Storage)

Reports the internal CF size in bytes, and whether any error was reported when the media was polled. The expected result is a number close to, but not exactly 128MB (for example, [127772672] bytes).

Analog Out

For future use only. The analog out feature is not currently supported.

Fax/Modem

This test verifies that a fax/modem card is present in the PC Card slot and that it responds correctly to AT commands.

Floppy Drive

The floppy drive test writes to and reads from a diskette inserted in the drive. For information about testing the floppy drive, see “Floppy Drive Test (FD)” on page 4-10.

NOTE The floppy drive test will fail if the diskette is write-protected, or if the test is started when there is no diskette in the drive.

Keyboard

A successful Keyboard test is one in which each key is properly recognized when pressed. For details on performing the test, see “Keyboard Test (K)” on page 4-12.

Onboard Flash

Reports the total onboard flash memory available in bytes, and whether any error was reported when the media was polled.

PC Card (PCMCIA Storage)

Reports the external PC card or PCMCIA card size in bytes (if installed), and whether any error was reported when the media was polled. For details on testing the PC card, see “PC Card Test (PCC)” on page 4-13.

Printer

Determines whether the printer is working properly.

For details on performing the test, see “Printer Test (P)” on page 4-9.

Network Ping

Determines whether a particular device/system is accessible over the network. Prompts you for an IP address to ping, then reports whether the ping was successful.

Serial Loopback

The cardiograph serial port is not currently used. However, if desired, you can test the serial port using the M1770-87909 Serial Port Loopback Connector available from SLI.

To test the cardiograph's serial port

- 1 Plug the smaller connector into the serial (RS-232) port on the rear panel of the cardiograph.
- 2 Select **Serial Loopback** from the pull-down menu, then press **Start**.
The Test Result dialog box appears displaying either a pass or fail message.

Suspend Button

With this test, you can test the **Suspend** button functionality independently of the software application.

Touch Screen

The Screen Test is used to verify the quality of the color displayed on the touch screen. For details on performing the test, see “Screen Test” on page 4-11.

Auto Tests

The following automated tests are run in sequence:

- 1 CompactFlash (CF)
- 2 Fax/Modem
- 3 Floppy Disk Drive
- 4 Onboard Flash
- 5 PC Card
- 6 Serial Loopback

Working with the Diagnostic Tests

Use the following controls to execute the selected diagnostic test.

■ Repeat/Count

To repeat a particular test or all auto tests sequentially, select the **Repeat** check box and type the desired count number in the **Count** field.

The count number decrements by one each time the test is completed (pass or fail).

To interrupt or stop testing, press **Stop** between tests.

■ Tester Info

Enter tester name and date.

■ Start

Starts the selected test.

■ Stop

Stops or interrupts the selected test

■ Print Cumulative Results

The cardiograph logs test results for each particular Service Utility session in the Test Results log.

To print the log, touch **Print Cumulative Results**.

The test results remain in the log until you either exit the Service Utility or touch **Clear Results**.

■ Clear Results

Clears the test results log.

Using the Software Installation Utility

Upgrading or reinstallation of the cardiograph and PIM software is performed using the Software Installation Utility. The Software Installation Utility uses the cardiograph's external PC Card slot to obtain software images from an inserted PC Card. Installation over the network, modem, or RS-232 serial interface is not currently supported.

The PageWriterTouch system software consists of four (4) main installable components:

- **PageWriterTouch Main Board OS** — Compressed Windows CE 3.0 kernel and support files that are necessary for normal system operation.
- **PageWriterTouch Application Software** — Executable and data files which comprise the cardiograph application.
- **Printer Controller Software** — The kernel image and application software required by the printer controller subsystem to interact with the main cardiograph system board and perform thermal printing tasks.
- **Patient Input Module (PIM) Software** — The kernel image and application software required by the PIM to interact with the main cardiograph system board and perform patient data acquisition tasks.

A 128 MB PC card and PCMCIA adapter are required for software installation. These items are available as part number 453563479701 from Philips Medical Systems.

To upgrade or reinstall any or all of the software components

Update the software components as described in Appendix B, “Software Installation Instructions.”

Viewing Log Files

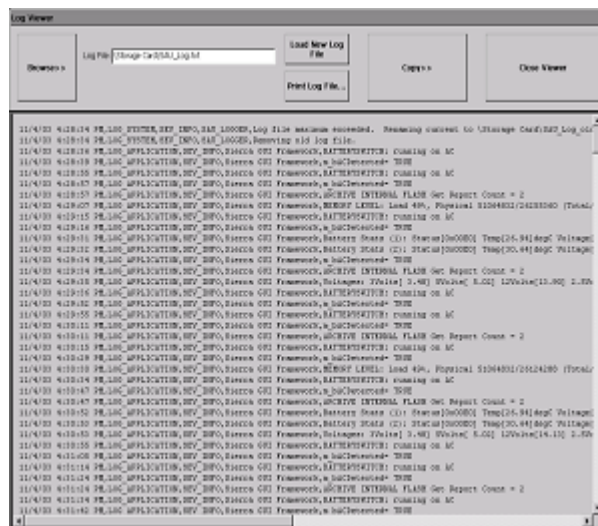
The cardiograph keeps a log of system events, ECG events, and monitor events (memory, voltage, and battery monitoring). The log file is sized for a few days content. The log file is an ASCII text file, which can be viewed on the cardiograph display, printed on the thermal printer, or saved to floppy diskette or PC card.

NOTE Printing of the log file on the cardiograph thermal printer is not recommended.

The recommended method of viewing the log files is to copy to the log file to floppy diskette, then analyze the log file on a separate PC using the PageWriterTouch Log file Viewer Utility. This utility parses the log files and creates charts showing memory load, physical memory, and virtual memory level. It also allows the user to export the charts, events, and related log entries to an HTML file and BMP files to be viewed in a web browser.

To display the Log Viewer window

- Touch **View Logs**.



NOTE The log viewer can also be displayed from the cardiograph configuration screen by pressing and holding the right CTRL and SHIFT keys while tapping the date and time in the upper right-hand corner of the display.

The active log file name shows in the dialog box at the top of the window. Two log files normally exist on the cardiograph as follows:

- **SAU_Log.txt** – The “active” log file that contains the most recent system events. This log file resides on in the Storage Card folder, and has a maximum size of 1 MB. Once the 1 MB limit is reached, the system events are automatically moved to the SAU_Log_old.txt file.
- **SAU_Log_old.txt** – The “old” log file that contains older system events. This log file also resides in the Storage Card folder, and also has a maximum size of 1 MB. Once the limit is reached, the oldest system events are automatically deleted as newer events are transferred to the log.

To access the log files

- 1 Touch **Browse**.
- 2 Once the desired log file is selected, touch **Load New Log File** to display the log file in the large screen area.

You can also copy the selected log file to floppy or PC card.

NOTE Make sure that the floppy diskette or PC card has sufficient space for the log file (approximately 1 MB each for the SAU_Log.txt and SAU_Log_old.txt log files). If there is not sufficient space, the log file will not be copied, and the message *Unable to copy to file* appears.

To copy the log file to floppy diskette or PC card

- 1 Load the desired log file (SAU_Log.txt or SAU_Log_old.txt) from the Storage Card folder.
- 2 Insert a floppy or PC card with sufficient space to store the copied log file.
- 3 Touch **Copy**.
The Open dialog box appears.
- 4 Select the destination folder, which in most cases will be Storage Card2.

NOTE If both a floppy diskette and a PC card are inserted, a Storage Card3 folder appears, as well.

- 5 Leave the file Name field blank and touch **OK** or press *Enter* to select the destination folder. If the wrong folder is selected, touch the **X** button or press *ESC* on the keyboard.
You are prompted to enter a file name.
- 6 Type the file name, then touch **OK** or press *Enter* to begin the copy process.
When the file copy is completed, a status message appears indicating whether the file was successfully copied.

Additional Service Utility Functions

Change Access Code

The Service Utility access code is set to “0000” at the factory. You can change the access code to any combination of four (4) numeric digits. If you lose or forget the access code, contact the Philips Response Center.

Calibrate Batteries

Battery calibration from the Service Utility screen is not currently supported. Battery calibration can be initiated from the Maintenance screen in Configuration. For details, see “Battery Maintenance and Care” on page 3-5.

Refresh Data

The information displayed in the Service Utility does not refresh automatically.

To refresh the Service Utility screen

- Touch **Refresh** to display the latest data.

Print Status

Allows you to print the information displayed in the Service Utility.

To print the contents of the Service Utility screen

- ▶ Touch **Print Status**.

If desired, type the tester name, date, and time in the Tester Info field for inclusion on the report.

Restart Unit

Touch **Restart Unit** to exit the Service Utility and reset the cardiograph. You must always reset the cardiograph after exiting the Service Utility.

Accessing the Windows CE Desktop

To access the Windows CE desktop

- 1 Place the cardiograph in Standby mode.

NOTE Entering the Service Utility requires a full reboot of cardiograph. Any unsaved patient data will be lost.

- 2 Perform a soft reset by pressing the Reset button adjacent to the USB connector on the rear panel of the cardiograph.

After approximately 40 seconds, the PageWriterTouch Splash screen appears, followed by an audible beep.

- 3 Quickly, while the splash screen is displayed, hold down the right *CTRL* and *SHIFT* keys together and tap the touch screen.

NOTE The splash screen disappears after five seconds, so if you miss it, you must reset the cardiograph again.

An Access Code window appears. If the Access Code window does not appear, try the right *CTRL*–*SHIFT*–touch sequence again.

- 4 Type the access code.
The factory default code is “0000”.
- 5 Type *explorer* at the command prompt.

To exit the Windows CE desktop

Press the Reset button located in the rear of the cardiograph.

If you lose the configuration password:

- 1 Access the Windows CE desktop.
- 2 Delete the following files to reset the configuration to the factory defaults:
 - \Storage Card\Sierra\activesettings.cfg
 - \Storage Card\Sierra\activesettings.bak

DC Voltage Test Points

Use this procedure to check the voltages produced by the power supply. All the voltage measurements are taken with respect to ground, unless indicated. Figure 5-6 shows voltage test point locations.

WARNING When the cardiograph is connected to AC power, dangerous voltages are present in the power supply. Do not touch any exposed metal while the cardiograph is open and AC power is connected.

Figure 5-6 Voltage Test Points in Power Supply

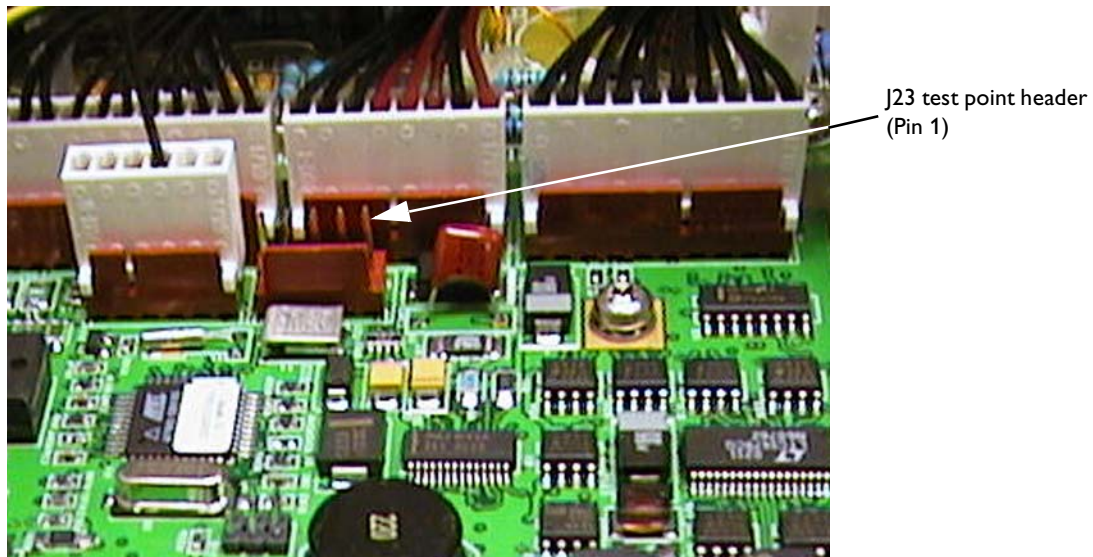
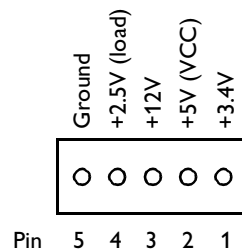
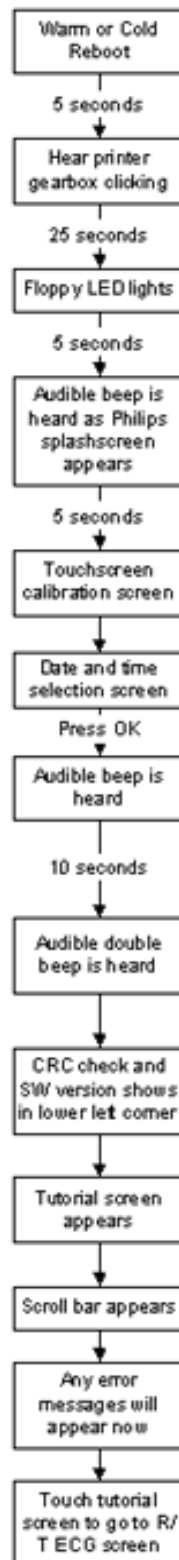


Figure 5-7 J23 Pin Schematic



Power On Sequence

The following sequence of events occur during a normal cardiograph boot (warm or cold boot).



Troubleshooting Cardiograph Issues

The troubleshooting tables in this section help you to localize a fault and correct it.

The following Symptom to Solution (troubleshooting) charts represent investigation action and solution steps that can, for the most part, be performed without the unit being opened. Several failure mode symptoms may actually be hardware induced or triggered, and may require board replacement or opening of the unit for inspection.

Display Issues

Table 5-1 Display Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Screen is dark and shows no image	Power issue: AC cord Action: Inspect AC power connections.	AC is applied and rear power switch is on but AC Power On indicator LED is dark.	Ensure AC cord is not damaged and is plugged into appropriate live AC power socket.
🔧	Power issue: Batteries Action: Open battery compartment door and inspect battery condition.	AC is not attached, and batteries are removed or showing no bars on their LCD displays.	Replace batteries, or plug in AC and turn on unit and allow batteries to charge by placing the unit in standby.
🔧	Power issue: Supply	AC is applied and rear power switch is on but AC Power On indicator LED is dark. AC cord and connection are verified and are good.	Unit must be serviced to replace power supply.
🔧	Standby mode failure	Unit's printer is making clicking sound every 6 seconds.	Press rear reset button to reboot unit
🔧	Main controller board failure	Unit's printer is making clicking sound every six (6) seconds. Reset button does not reboot unit.	Unit must be serviced to replace main controller board.
🔧	Unit is in standby Action: Press the Standby button on the front display.	Confirm the unit wakes-up and displays the blue tutorial screen.	User training on proper use of unit's standby mode.

Table 5-1 **Display Issues** *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Screen shows a solid color and no image	Application boot problem: software installation failure Action: Press the rear reset button.	Confirm unit goes to black screen (no image) clicks, and returns to solid color on screen.	Unit must be serviced to reinstall application software.
🔧	Application boot problem: CF card failure Action: Press the rear reset button.	Confirm unit goes to black screen (no image) clicks, and returns to solid color on screen.	Unit must be serviced to replace CF card and reinstall application software.
🔧	Application boot problem: CF card failure Action: Press the rear reset button.	Unit boots successfully.	Unit should be serviced to replace CF card and reinstall application software.
🔧	Application boot problem: software installation failure Action: Press the rear reset button.	Unit boots successfully.	Perform full software installation again. Confirm successful completion.

Touch Screen Issues

Table 5-2 Touch Screen Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Touch Screen is unresponsive or taps appear to be offset from actual press point on screen	<p>Touch screen is out of calibration</p> <p>Action: Ensure nothing is pressing or leaning on the touch screen surface.</p> <p>Reset unit using rear button and launch Service Utility. Run Touch Screen test (page 4-10), attempt to calibrate and perform test.</p>	Calibration resolves issue.	User training on proper use of startup calibration screen.
❏	<p>Touch Screen device hardware failure</p> <p>Action: Ensure nothing is pressing or leaning on the touch screen surface.</p> <p>Reset unit using rear button and enter Service Utility. Run Touch Screen test (page 4-10), attempt to calibrate and perform test.</p>	Calibration cannot be completed.	Unit must be serviced to inspect and possibly replace Touch Screen, cabling or main controller board.

Keyboard Issues

Table 5-3 Keyboard Issues



Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Keyboard is unresponsive	Keyboard controller subsystem has experienced failure Action: Reset unit using rear button and launch Service Utility. Run the Keyboard test (page 4-12).	Unable to enter Service mode after boot. Keyboard is still unresponsive.	Unit must be serviced to inspect and possibly replace keyboard, cabling, or main controller board.
	Keyboard controller subsystem has experienced failure Action: Reset unit using rear button and launch Service Utility. Run the Keyboard test (page 4-12).	Keyboard is now functional.	Occasional recoverable keyboard failures have been observed. If failures persist, unit must be serviced to inspect and possibly replace keyboard, cabling, or controller board.
Keyboard is typing incorrect characters	Keyboard has Caps Lock enabled Action: Inspect the incorrect typed characters on the display. If only the case of the characters is incorrect, press the Caps Lock key.	Do the characters now appear correctly?	User training on Caps Lock use.
	Keyboard controller subsystem has experienced failure Action: Reset unit using rear button and launch Service Utility. Run the Keyboard test (page 4-12).	Unable to enter Service mode or unable to complete keyboard test successfully. Keyboard is still typing incorrect characters.	Unit must be serviced to inspect and possibly replace keyboard, cabling, or main controller board.

Table 5-3 Keyboard Issues *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Keyboard is typing incorrect characters <i>(cont.)</i>	Keyboard controller subsystem has experienced failure Action: Reset unit using rear button and launch Service Utility. Run the Keyboard test (page 4-12).	Keyboard is now functional.	Occasional recoverable keyboard failures have been observed. If failures persist, unit must be serviced to inspect and possibly replace keyboard, cabling, or controller board.

Signal Acquisition Issues

Table 5-4 Signal Acquisition Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
System displays message: Signal Acquisition Failure, Please Wait	PIM communications have been temporarily lost or interrupted Action: If the Check Patient Input Module Connection message has not yet been displayed, wait for the recovery operation to complete.	Message self-closes, indicating PIM communications resumed. or Check Patient Input Module Connection message is displayed, indicating PIM communications could not be resumed.	Recoverable PIM communications errors may occur under certain AC power conditions and static discharge situations. Allow the system to attempt recovery. If the condition persists, the unit must be serviced to inspect and possibly replace the PIM, PIM to cardiograph cabling, or connector hardware.
System displays message: Input Signal Acquisition Error, Patient Info Module Signal Acquisition Error. Please Check the Patient Input ModuleConnection.	PIM failure Action: Reset unit using rear button and launch Service Utility. Examine the PIM Revisions information and PIM Status values displayed.	The service mode displays <not found> for PIM revision and device status values. or The PIM Status display does not indicate Present, CH:12; No Flags.	Unit must be serviced to inspect and possibly replace the PIM, PIM to cardiograph cabling, or connector hardware.

Table 5-4 Signal Acquisition Issues *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
One or more leads show leads off (red dashed line) <i>periodically</i>	Defib or high noise event Action: Observe frequency and recovery behavior.	Leads off coincides with electrode movement or placement or defib event.	The PIM performs an automatic ranging action when input signals vary significantly. If this behavior persists in the absence of electrode movement or defib events, the unit should be serviced to inspect and possibly replace the PIM, or lead cables.
One or more leads show leads off (red dashed line) <i>periodically</i>	Electrode lead failure Action: Attach ground plate to leads and observe lead status. Confirm that the physical connections between the lead cables and PIM are good and the cables are undamaged.	Lead(s) still showing leads off periodically.	The unit should be serviced to inspect and possibly replace the lead cables, and inspect the lead cable connections on the PIM.
One or more leads show leads off (red dashed line) <i>continuously</i>	Electrode lead failure Action: Attach ground plate to leads and observe lead status. Confirm that the physical connections between the lead cables and PIM are good and the cables are undamaged.	Lead(s) still showing leads off.	The unit should be serviced to inspect and possibly replace the lead cables, and inspect the lead cable connections on the PIM.

Real Time Screen Issues

Table 5-5 Real Time Screen Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
System displays message: Signal Acquisition Failure, Please Wait	PIM communications have been temporarily lost or interrupted Action: If the Check Patient Input Module Connection message has not yet been displayed, wait for the recovery operation to complete.	Message self-closes, indicating PIM communications resumed. or Check Patient Input Module Connection message box is displayed, indicating PIM communications could not be resumed.	Recoverable PIM communications errors may occur under certain AC power conditions and static discharge situations. Allow the system to attempt recovery. If the condition persists, the unit must be serviced to inspect and possibly replace the PIM, PIM to cardiograph cabling, or connector hardware.
Waveform display is no longer updating, system is unresponsive	Application error has occurred Action: Wait for 2 minutes or longer. If automatic reset message does not appear, press the rear reset button.	Unit resets and boots up without error.	Recoverable application freezes have been observed under high use and certain system stress scenarios. If failures persist, the unit must be serviced to inspect and possibly replace the internal CF card or main controller board.
Waveform display is no longer updating, system is unresponsive	Main controller board failure Action: Wait for 2 minutes or longer. If automatic reset message does not appear, press the rear reset button.	Unit shows black or solid color display.	Unit must be serviced to inspect and possibly replace the internal CF card or main controller board.
System seems to be running slowly after boot-up	Duplicate static IP configured for network Action: Confirm that the static IP assigned is not already in use on LAN.	IP was already in use.	It has been observed that boot up and operation can initially be slower when the PWT is configured for an IP address that is already in use on the network.

Table 5-5 Real Time Screen Issues *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Timed ECG acquisition fails	Archive full Action: Confirm that the main archive is reporting available ECG storage space.	Archive has no available ECG storage space.	The timed ECG function requires some main archive storage space to work correctly.

Archive Screen Issues

Table 5-6 Archive Screen Issues



Symptom	Possible Cause & Investigation Step	Confirmation	Solution
An error message appears mentioning Storage Card2 or Storage Card3 during floppy operations.	Floppy disk error Action: Follow directions on message, or replace the floppy and retry the operation.	Operation succeeds after retry or with different floppy diskette.	Floppy media exhibits wear and defects and may be incompatible with the cardiograph's disk drive. If the problem persists with several floppies, the unit should be serviced to inspect and possibly replace the floppy disk drive.
	Floppy disk drive failure Action: Follow directions on message, or replace the floppy and retry the operation.	Floppy operations continue to fail.	The unit must be serviced to inspect and possibly replace the floppy disk drive.
After attempting an Archive screen operation, an error message appears: Commandtimed-out.	TraceMaster system is busy Action: Retry TraceMaster operation.	Operation succeeds on subsequent try.	Transfer operations use network and server resource, which may occasionally be unable to service the requests.
	Network or modem phone line was interrupted during operation Action: Retry operation. Inspect cabling to network or analog phone line.	Operation succeeds on subsequent try. or Damaged cabling or intermittent connection found.	Transfer or query operations require reliable access to the network transport.

Table 5-6 **Archive Screen Issues** *(continued)*


Symptom	Possible Cause & Investigation Step	Confirmation	Solution
After attempting an Archive screen operation, an error message appears: Requested Function Failed.	Selected external archive media was not available Action: Verify that selected archive media is inserted correctly (floppy or PC card).	Media is not present. or Media is not operational.	Attempting operations on invalid or missing external media archives will fail with this displayed message. Retry with correct and operational media inserted.
	An attempt to transfer an unsupported ECG report type was made to TraceMaster Action: Inspect ECG that failed the requested operation for selected format (report type).	Format is Pan 12 or 12x1.	Certain new report types are not supported by and will be rejected by the TraceMaster management system.
When an error occurs during transfer of multiple ECGs to a TraceMaster system, the transfer process does not continue and transferred files are not deleted.	Application limitation Action: None.	Current system limitation.	The current PageWriterTouch operations fail in a known safe manner when multiple ECG transfer operations are interrupted. Retry the transfer for the remaining ECGs.
After touching the Archive button, it takes longer than 40 seconds before the Archive list is displayed when the main archive has more than 130 ECGs stored.	System slow-down from full ECG database Action: Save or delete ECGs from the main archive.	Entry into the Archive Screen is faster.	There is a known system performance impact when the near maximum (150) number of ECGs has been stored in the main archive area.
The message Requested Function Failure appears after FAX ECG transmission has completed.	Fax application time-out Action: Dismiss the Fax dialog box after transmission completes by touching OK .	Message no longer appears after FAX ECG transmission.	The FAX application requires the user to close the dialog box after success is reported. Otherwise, the operation times out and indicates a failure.

Table 5-6 **Archive Screen Issues** *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Transfer of an ECG to a PC card flash archive fails and there are still less than 100 ECGs on the flash card.	PC card flash file system limitation Action: Delete extra non-ECG files from flash card and retry.	ECGs can now be transferred.	Flash cards root directories use the FAT16 file system which has restrictions on the maximum number of files. If non ECG files are included on the flash card, even though there is remaining space, the ECG copy may fail since directory space is limited.
Some ECGs retrieved from TraceMaster and printed on the cardiograph look different from TraceMaster prints or XLi printouts.	Older or non-PageWriterTouch source ECG files were retrieved Action: Inspect the printed report date and information	ECG was not created by a PageWriterTouch cardiograph.	Retrieving and printing older ECG files that were not sourced by the PageWriterTouch cardiograph can have the following differences when printed: <ul style="list-style-type: none"> ■ Algorithm version appears as HPxxx on TraceMaster and PH on PageWriterTouch. ■ Pacer tick marks are not present on PageWriterTouch printout. ■ Frank lead system generates 3 rhythm traces with flat line and no lead label on PageWriterTouch printout. ■ Custom lead names do not appear on PageWriterTouch printout. ■ PageWriterTouch prints full interpretations regardless of original Xli ECG settings.

Table 5-6 Archive Screen Issues *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Some ECGs retrieved from TraceMaster and printed on the cardiograph look different from TraceMaster prints or XLI printouts.	IEC lead format printed on AHA cardiograph (or vice-a-versa) Action: Confirm ECG retrieved from TraceMaster is using same lead format as cardiograph.	ECG does not match lead standard of cardiograph being used to print.	The current cardiograph does not support mixing of lead standard reports.

Configuration Screen Issues

Table 5-7 Configuration Screen Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
After entering and exiting configuration screen repeatedly the unit becomes unresponsive.	Application error Action: Press the rear reset button.	Unit resets and boots up successfully.	It has been observed that after repeated entry and exit into the PageWriterTouch configuration screens, the unit may become unresponsive to user input.
After choosing Factory Defaults Settings on the System Tab and touching Apply Default Settings , the defaults were not applied.	Application error Action: Repeat the action and press the Profiles button prior to leaving the Configuration screen.	Factory defaults are successfully applied.	The application currently will not apply the defaults unless the Profiles button is pressed prior to exiting the Configuration screen.
After typing a computer name on the Network tab and saving the settings, the name displayed in Configuration afterward is WinCE.	Application error Action: Enter a computer name without invalid characters or spaces.	Computer name is correctly saved.	Currently, the application does not prevent the user from entering invalid Windows names using embedded spaces and invalid characters. When an invalid name is entered, the system defaults to using WinCE as the computer name.

Help Screen Issues

Table 5-8 Help Screen Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
After trying to scroll the Help screen, the help disappears and a white area is visible on the display.	Application error Action: Touch the Help button twice.	The white area is now replaced by the Help screen.	Tapping slightly off the edge of the help screen scrollbar when the Touch Screen is not correctly calibrated may hide the Help screen.

Printer Issues

Table 5-9 Printer Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
After the paper drawer was opened during printing, the print image was corrupted or incorrect.	Printer controller error Action: None	Printing continued on to second page when only one page was expected.	Occasional printer controller status errors can occur when opening the paper drawing during printing.
After the paper drawer was opened during printing, the print image was corrupted or incorrect and the paper does not stop feeding.	Printer controller error Action: Press the rear reset button.	Unit resets and boots correctly. Paper stops feeding.	Occasional printer controller status errors can occur when opening the paper drawing during printing.
The message Printer Door is Open appears, and the unit is not responding.	Application error Action: Press the rear reset button.	Unit resets and boots correctly.	It has been observed that on rare occasions a Printer Door Open message cannot be dismissed because of overlapping simultaneous error status reporting.
The message Check Printer appears with no apparent printer problem present.	Printer controller error Action: Open and close printer paper drawer.	Message does not reoccur	Infrequently, the printer controller may indicate a printer mechanism status error when no error exists. This has been noted specifically when A4 paper is in use.

Table 5-9 **Printer Issues** *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Printed report looks too small or compressed.	Printer controller error Action: Press the rear reset button.	Unit resets and boots correctly. Reports print correctly.	On very rare occasions, reports with A4 paper show a compressed image. Reset the unit to resolve the issue.
After opening and closing the paper drawer rapidly many times, the unit was unresponsive.	Printer controller error Action: Press the rear reset button.	Unit resets and boots correctly. Reports print correctly.	A rapid and sustained repeating open-and-close action on the paper drawer can cause an application error related to printer status handling.
Printer Error: Out of Paper/Paper Jam/Door Open	<ul style="list-style-type: none"> ■ Paper drawer is not fully closed ■ Out of paper, or paper loaded incorrectly ■ Defective TOF sensor assembly ■ Defective paper tray assembly 		<ul style="list-style-type: none"> ■ Open and firmly close the paper drawer. ■ Open paper drawer and check to make sure paper is aligned correctly. ■ Replace TOF sensor assembly. ■ Replace paper tray assembly.
Printer not detected message	<ul style="list-style-type: none"> ■ Application error ■ Unseated or defective main harness assembly ■ Defective printer control board 		<ul style="list-style-type: none"> ■ Press the rear reset button. ■ Check seating of main harness assembly. Replace if necessary. ■ Replace the printer control board.
Paper does not advance	<ul style="list-style-type: none"> ■ Application error ■ Defective TOF sensor assembly ■ Defective printer gearbox assembly 		<ul style="list-style-type: none"> ■ Press the rear reset button. ■ Replace the TOF sensor assembly. ■ Replace the printer gearbox assembly.

Table 5-9 Printer Issues *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Paper does not tear off cleanly, or paper stops at the wrong spot.	<ul style="list-style-type: none"> Wrong paper size setting Wrong method is being used to tear off paper 		<ul style="list-style-type: none"> Check that paper size is correctly set in the cardiograph configuration. Refer to the <i>PageWriterTouch Instructions for Use</i> for proper method for tearing paper.
Printer is OK message	Application error		<ul style="list-style-type: none"> Open and close paper tray. Press the rear reset button.
Blank pages printed after report	Wrong paper size setting		Check that paper size is correctly set in the cardiograph configuration.

Floppy Drive Issues

Table 5-10 Floppy Drive Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
The message An unformatted disk has been inserted appears when unsuccessfully trying to eject a floppy from the disk drive.	<p>Floppy disk driver error</p> <p>Action: Select No when asked to format the drive, and close the dialog box.</p> <p>Press the floppy Eject button firmly in one motion.</p>	Floppy disk ejects and no message is displayed.	<p>The floppy disk drive software can become confused about media status when the Eject button is partially pressed.</p> <p>If the problem persists with several floppies, the unit should be serviced to inspect and possibly replace the floppy disk drive.</p>
Transferring 5 to 6 ECGs from archive to the floppy fails when there should be enough space on the disk.	<p>Application error</p> <p>Action: Copy 4 ECG files, then copy the remaining 2 ECG files.</p>	Copy works without error.	Current limitations in ECG file size estimation cause the application to overestimate the size of five to six ECGs, causing the batch copy to fail the free-space check.

Table 5-10 Floppy Drive Issues *(continued)*

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
System is unresponsive after pressing Cancel when Floppy Un-Mount Failed message was displayed.	Application error handling failure Action: Press the rear reset button on the cardiograph.	Unit resets and works without subsequent error.	If the floppy disk in use is removed from the drive prior to unmounting, the application has been seen to crash when the user presses Cancel instead of Retry in response to the application error display.

PC Card Issues

Table 5-11 PC Card Issues

Symptom	Possible Cause & Investigation Step	Confirmation	Solution
Occasionally, copying ECGs from archive to Flash card fails.	PC card subsystem time-out failure Action: Retry the transfer operation.	Operation succeeds without error.	Write operations occasionally fail for Flash cards. If this condition reoccurs persistently, replace the flash card.
Modem is unavailable after removing and reinserting the PC card into the cardiograph.	Main controller error Action: Put the unit into standby, and then press the rear reset button.	Modem is now available.	Hot-swapping the modem after boot of the system is not supported. You must reset the system when reinserting the modem PC card.

Removing and Replacing Cardiograph Components

This chapter contains information for removing and replacing the PageWriterTouch cardiograph subassemblies. For information about the Philips repair philosophy, see “Repair Philosophy” on page 5-1.

If you require further technical assistance, contact the nearest Philips Response Center.

NOTE The way the wires and cables are routed and dressed inside the main housing plays an important part in reducing electromagnetic and radio frequency interference emitted by the cardiograph. When you reassemble any part of the cardiograph, make sure to route and dress all cables and wires as they were originally.

This chapter provides the following information:

Required Tools.	6-2
Removing and Replacing Batteries.	6-2
Patient Interface Module (PIM)	6-3
Removing and Replacing the AC Fuses	6-7
Removing and Replacing the Paper Tray	6-7
Removing and Replacing the Top Cover	6-8
Removing and Replacing the Display.	6-12
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Removing and Replacing the Top of Form Sensor Cable Harness	6-37
Removing and Replacing the Display Hinge Bracket.	6-39

Required Tools

Use the following tools to remove and replace the PageWriterTouch cardiograph subassemblies:

- #1 Phillips Head screwdriver
- T10 Torx driver
- T15 Torx driver
- T25 Torx driver
- Optional T25 Torx T-handle driver with 8" long shank (available from Philips Medical Systems, part number 453563479711)
- Diagonal cutters (for cutting cable ties)
- 5 mm and 8 mm hex nut drivers
- 13 mm open end wrench
- Tweezers
- Small flat bladed screwdriver

Removing and Replacing Batteries

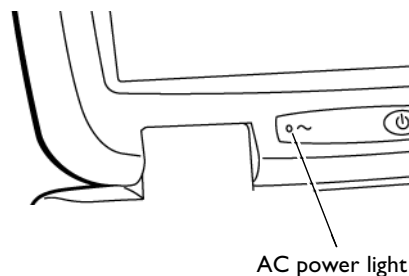
Removing the Batteries

To remove the batteries

- 1 Unplug the AC power cord.

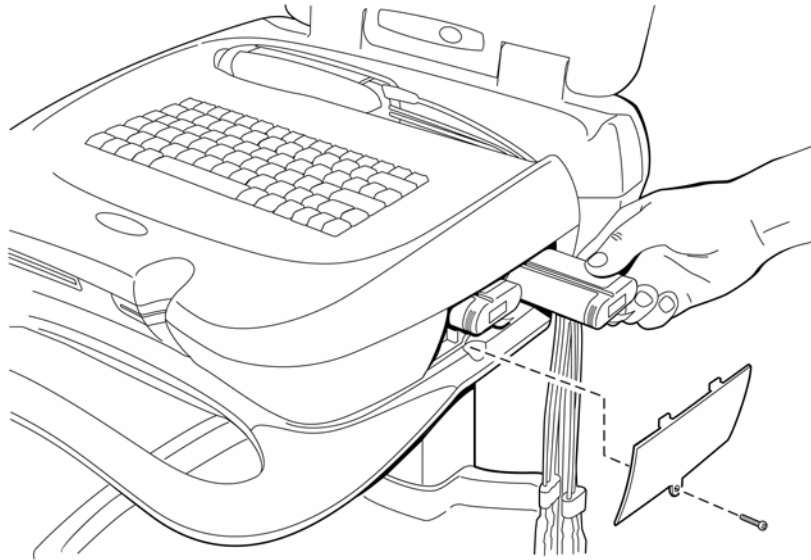
Make sure the AC power switch at the rear of the cardiograph is turned to the Off position and the green AC power light is not illuminated.

Figure 6-8 AC power light indicator



For an overview of cardiograph components, see “PageWriterTouch Cardiograph Components” on page 1-6.

- 2 Unscrew the battery door using a Phillips head screwdriver.
- 3 Pull the tabs to remove the batteries.

Figure 6-9 Removing the Batteries

WARNING Properly dispose or recycle any depleted batteries according to local regulations. Do not disassemble, puncture, or incinerate the batteries.

Replacing the Batteries

To replace the batteries

- 1 Insert the new batteries at the same time into the battery compartment. See page 6-3.
- 2 Re-attach the battery door.
- 3 Tighten the screw to the battery door using a Phillips head screwdriver. Do not over tighten.

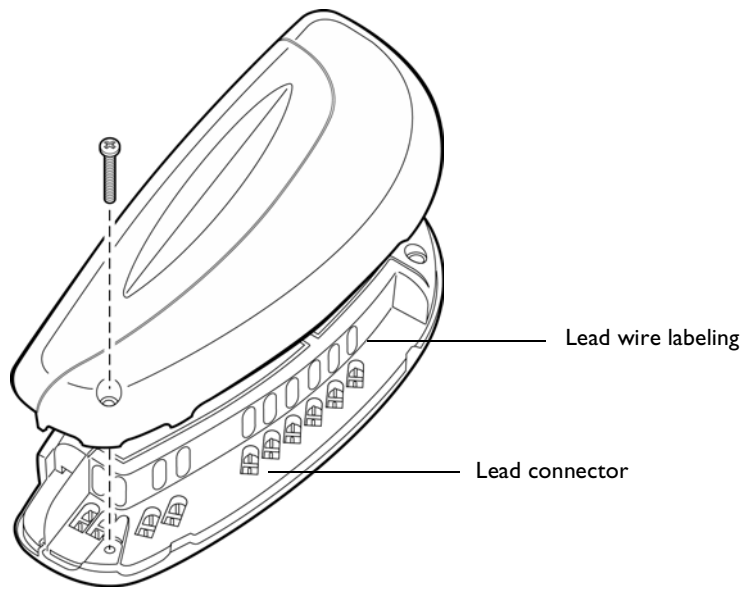
Patient Interface Module (PIM)

The patient interface module (PIM) is a hand-held device that contains all of the cardiograph's waveform data acquisition electronics and an Action button to take 12-lead Snapshots from the bedside. The PIM connects to the patient data cable and to the lead wires attached to the patient.

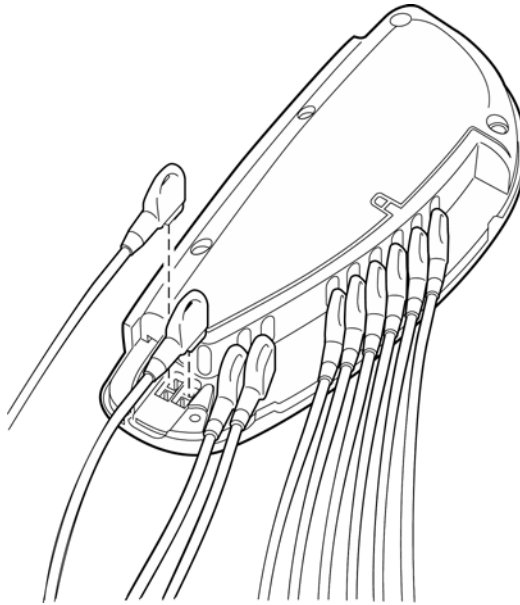
Replacing Lead Wires

To replace the lead wires

- 1 Unscrew the PIM cover (using a Phillips head screwdriver.)
- 2 Remove the PIM cover to expose the lead wire connectors. The inside of the PIM is labeled to identify the lead wire connections.

Figure 6-10 Unscrewing the PIM Cover

- 3 Remove the lead wire(s) by pulling the connector up.

Figure 6-11 Removing Lead Wires

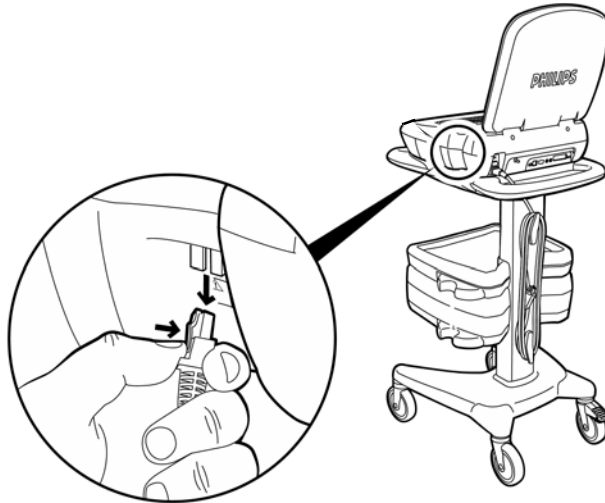
- 4 Match the lead wire labeling (on lead) with the same lead wire connector on the PIM. Replace the lead wire by firmly pressing the connector into the socket until fully seated.
- 5 Attach the PIM cover.

Removing the PIM

To remove the PIM

- 1 Disconnect the PIM data cable from the RJ-11 receptacle, located on the right side of cardiograph.

Figure 6-12 Disconnecting the PIM Data Cable



- 2 Remove the data cable.

CAUTION Due to the complexity of the PIM, do not attempt to troubleshoot or replace individual parts. You must replace the entire assembly.

Replacing the PIM

To replace the PIM

- 1 Connect the PIM to the RJ-11 receptacle, on the right side of the cardiograph.
- 2 After replacing the PIM, load the PIM software from the internal CompactFlash (CF) card as described in Appendix B, "Software Installation Instructions" on page B-5.

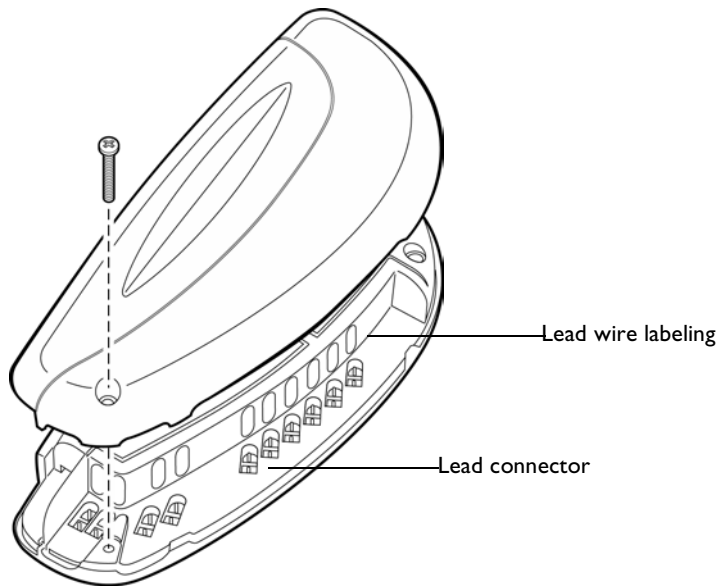
WARNING To ensure personal safety and to prevent damage to the system, connect the data cable only to the RJ-11 receptacle, located on the right side of the cardiograph. Do not connect the data cable into the LAN port or into the optional modem card dongle.

Replacing the PIM Data Cable

To replace the data cable

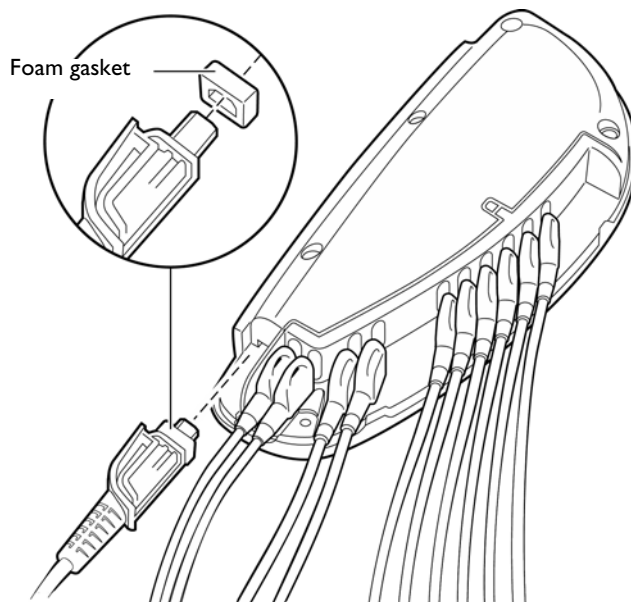
- 1 Unscrew the PIM cover using a Phillips head screwdriver. See page 6-3.

Figure 6-13 Unscrewing the PIM Cover



- 2 Disconnect and replace the data cable. Make sure to attach the foam gasket.

Figure 6-14 Disconnecting the Data Cable



- 3 Attach the PIM cover.

Removing and Replacing the AC Fuses

The AC fuses need to be replaced when the cardiograph is plugged into AC power, with the AC power switch turned to the On position, but the green AC power indicator light does not illuminate.

For information about replacing fuses, see “Replacing the AC Fuses” on page 3-8.

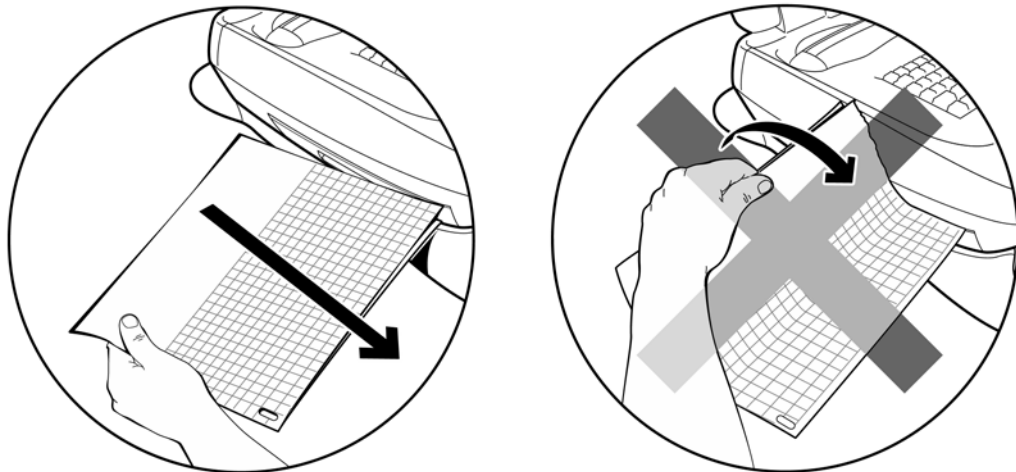
Removing and Replacing the Paper Tray

Removing the Paper Tray

To remove the paper tray

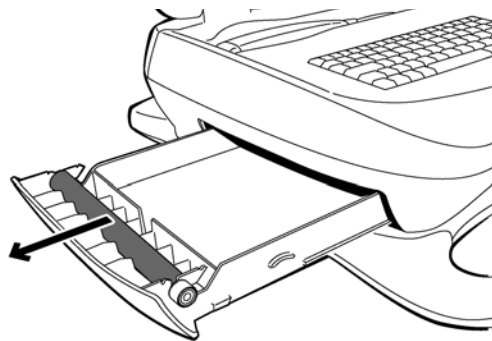
- 1 Tear off any unused thermal paper.

Figure 6-15 Tearing Off Excess Thermal Paper



- 2 Pull out the paper tray until it stops.

Figure 6-16 Opening the Paper Tray



- 3 Remove any unused paper.
- 4 Carefully lift tray, and pull it out completely.

Replacing the Paper Tray

To replace the paper tray

- 1 Insert the paper tray into the opening.
Make sure the metal bar is above the paper tray.
- 2 Close the paper tray.

Removing and Replacing the Top Cover

Removing the Top Cover

CAUTIONS When you remove the top cover, make sure the cardiograph is securely mounted to the cart or is on a large stable surface. Failure to do so can cause the cardiograph to tip.

The nylon screws are made of a composite, that can be easily damaged. Be careful when removing them.

WARNING Do not touch any of the exposed connectors if you have batteries installed, or if the AC power cord is connected while the cardiograph is open. When the batteries are installed or the cardiograph is connected to AC power, there are dangerous voltages on the certain components even if the AC power switch is set to Off.

This procedure is most easily performed with the cardiograph attached to the cart, if present.

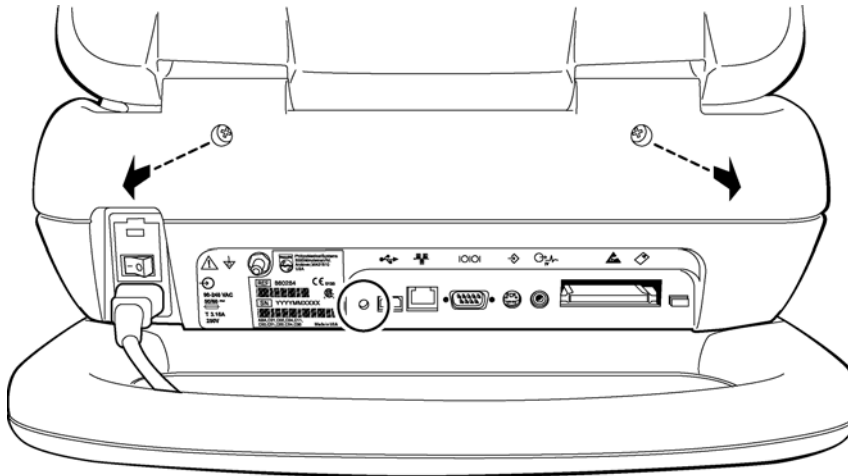
To remove the top cover

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the paper tray. See page 6-7.
- 4 Remove the two M5 screws from the underside of the bottom housing, using a T25 Torx driver.

You can remove the two screws while the cardiograph is on the cart through the access holes in the shelf, or if the cardiograph is not on a cart, turning the cardiograph over.

Figure 6-17 Removing the Top CoverRemoving screws with
cardiograph on cartTurning cardiograph upside
down and removing screws

- NOTE** Use a T-Handle T25 Torx driver with a length of at least 7" (part number 453563479711).
- 5 If the unit is upside down, turn it right side up carefully, as the loosened screws will fall out.
 - 6 Using a Phillips-head screwdriver, remove the rear console cover by carefully removing the two (2) M5 x 12mm nylon screws from the rear of the top cover.

Figure 6-18 Removing the Rear Console

- 7 Rotate the display as shown.

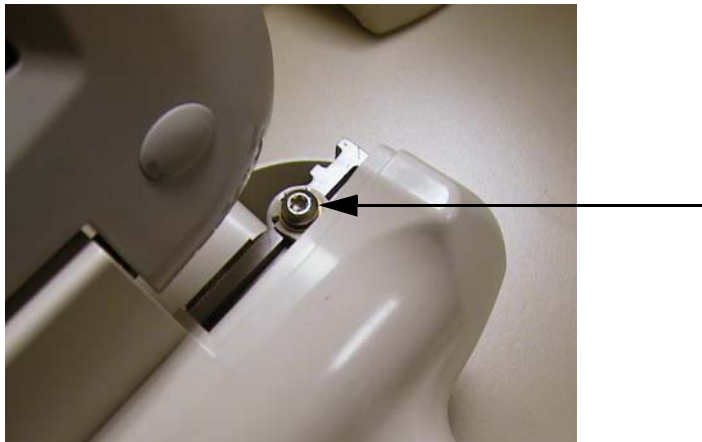
Consider placing something under the display as the weight will tip the cardiograph back.

Figure 6-19 Rotating the Display Down



- 8 Remove the two (2) M5 x 12mm screws, one on each side of the bracket, that attach the top cover to the hinge bracket.

Figure 6-20 Removing the Screws From the Hinge Bracket



- 9 Lift the top cover slightly and disconnect the PS2 keyboard cable from the main control board.

Be sure to grasp the collar when removing the connector, as shown.

Figure 6-21 Disconnecting the Keyboard Cable



- 10 Fully remove the cover, and set it aside.

Replacing the Top Cover

CAUTIONS When you replace the top cover, make sure the cardiograph is securely mounted to the cart or is on a large stable surface. Failure to do so can cause the cardiograph to tip.

The nylon screws are made of a composite, that can be easily damaged. Be careful when removing them.

To replace the top cover

- 1 Make sure that keyboard cable is routed as shown.

Figure 6-22 Keyboard Cable Routing



- 2 Place the top loosely into position and connect the keyboard cable to the PS2 connector on the main control board.

NOTE Do not hold the connector by the collar (Figure 6-21) when pressing down. Be sure to hold the connector by the strain relief, as shown in Figure 6-23.

Figure 6-23 Attaching the Keyboard Cable Connector



- 3 Place the top cover into position, and secure the top to the hinge bracket with the two (2) M5 x 12mm screws. See Figure 6-20.
- 4 Reattach the rear cover, and tighten the two (2) M5 x 12mm nylon screws. See Figure 6-18.
- 5 Replace the screws in the underside of the bottom housing, and tighten using a T25 Torx driver.

Removing and Replacing the Display

The display housing assembly is a highly complex assembly consisting of the LCD display, touch screen, and associated interface circuitry and cables.

CAUTION Due to the complexity of the display, do not attempt to troubleshoot or replace individual parts. You must replace the entire display.

Removing the Display

To remove the display

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top and rear covers. See page 6-8.

CAUTION: When you remove the top assembly, make sure the cardiograph is securely mounted to the cart or on a large stable surface. Failure to do so can cause the cardiograph to tip.

WARNING Do not touch any of the exposed connectors if you have batteries installed, or if the AC power cord is connected while the cardiograph is open. When the batteries are installed or the cardiograph is connected to AC power, there are dangerous voltages on the certain components even if the AC power switch is set to Off.

- 4 Cut the tie wrap securing the display cable to the hinge bracket, as shown below. Do not damage cable.

Figure 6-24 Cutting the Tie Wrap



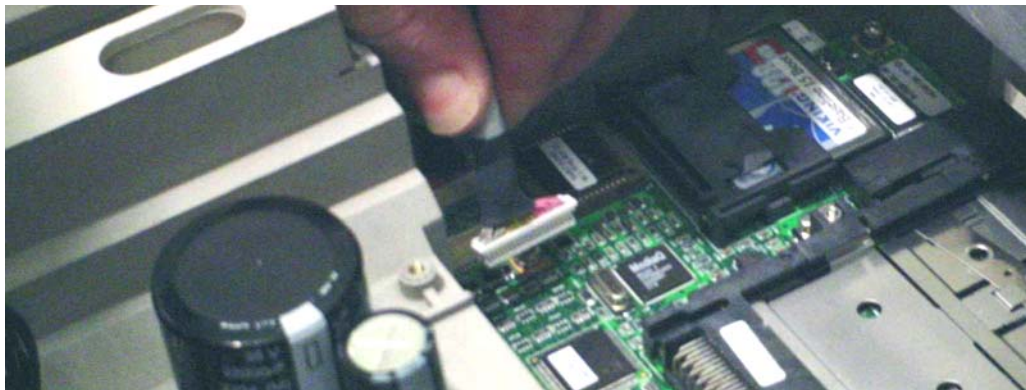
- 5 Remove the display cable from the bracket by carefully pulling it to the side.

Figure 6-25 Removing Display Cable From Bracket



- 6 Disconnect the white J8 and J9 connectors by pulling the display cable straight upward.

Figure 6-26 Pulling Out the J8 and J9 Connectors



- 7 Rotate the display so that it is completely closed.

- 8 Remove the four M4 screws from the hinges.

CAUTION: The display housing assembly is heavy. To prevent the display from falling, support it as you rotate or remove it.

Figure 6-27 Removing the Hinge Screws



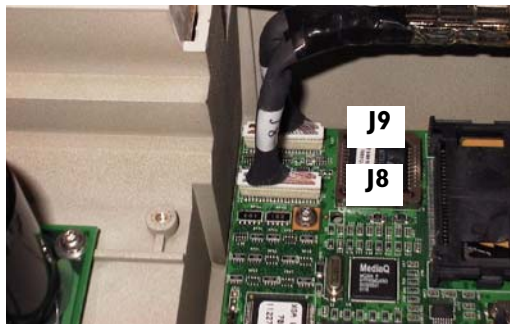
- 9 Lift the display from the main housing.

Replacing the Display

To replace the display

- 1 Align the display hinges with the display bracket.
- 2 Using new M4 x 9.5 mm screws for the replacement display, tighten one hinge at a time securely to the display bracket.
- 3 After you securely tighten all four screws, check for any misalignment in the display hinges by opening and closing the display.
- 4 Insert J9 and J8 connectors into the main control board, as shown.

Figure 6-28 Orientation For J8 and J9 Connectors



CAUTION Do not reverse connectors or you could cause permanent damage to the main control board. The numbers are indicated next to each connector.

- 5 Insert the display cable into the bracket, as shown.

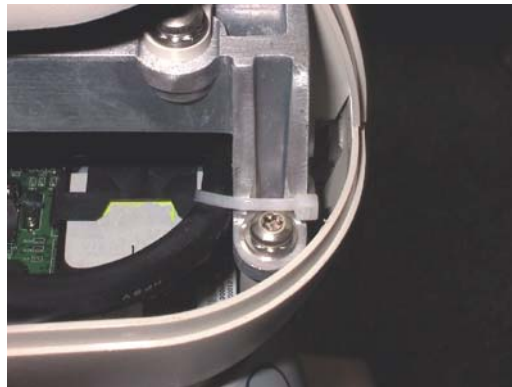
Figure 6-29 Inserting the Display Cable Into the Bracket



NOTE Make sure the grounded-shield portion of the cable fits snugly into the bracket fingers, with no tension or twisting in the cable between the bracket and the J8 and J9 connectors.

- 6 Install the tie wrap in the following location, as shown. Remove any excess.

Figure 6-30 Location of the Tie Wrap For the Display



- 7 Re-attach top cover. See page 6-11.
- 8 Re-attach rear cover.

Removing and Replacing the Keyboard Assembly

Removing the Keyboard Assembly

To remove the keyboard assembly:

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-8.
- 4 Turn the top cover over.

- 5 Open the lock on the keyboard flex cable connector, and then disconnect the flex cable from the keyboard, as shown.

Figure 6-31 Disconnecting the Flex Cable

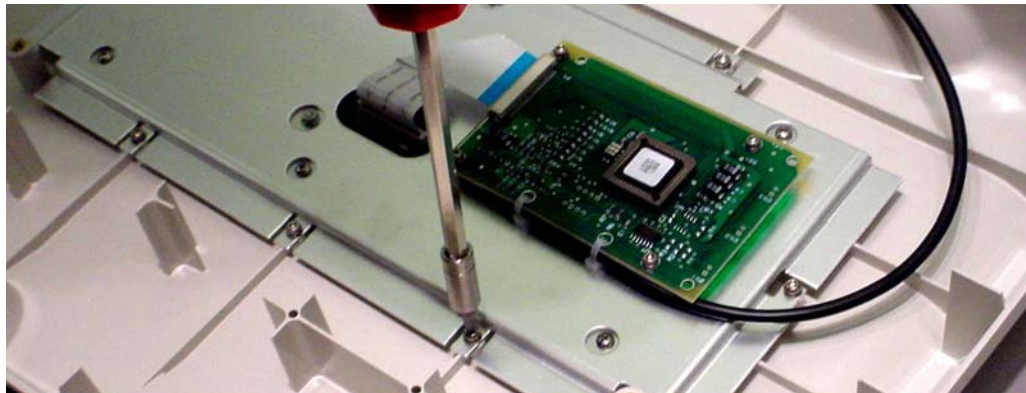


- 6 Remove the eight screws from the edge of the keyboard bracket, as shown.

CAUTION

The keyboard and interface card should be replaced as a complete assembly.

Figure 6-32 Removing Screws From the Keyboard Bracket



- 7 Remove the interface card from the keyboard bracket by removing the four screws.

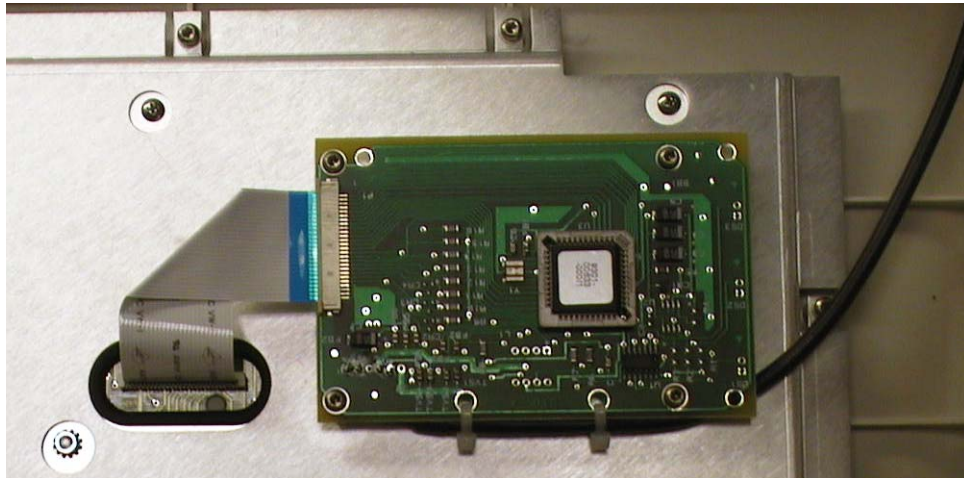
Replacing the Keyboard Assembly

To replace the keyboard assembly

- 1 Place keyboard in opening of the top cover.
- 2 Place bracket over keyboard and align the mounting holes on the keyboard bracket to the inserts on the top housing.
- 3 Insert the eight (8) M3 x 6mm screws that fasten the bracket to the top housing.
- 4 Insert the four (4) M3 x 8 mm screws that fasten the interface card to bracket.

- 5 Open the lock on the keyboard flex cable connector, and insert the flex cable into the keyboard.

Figure 6-33 Correct Placement of the Flex Cable



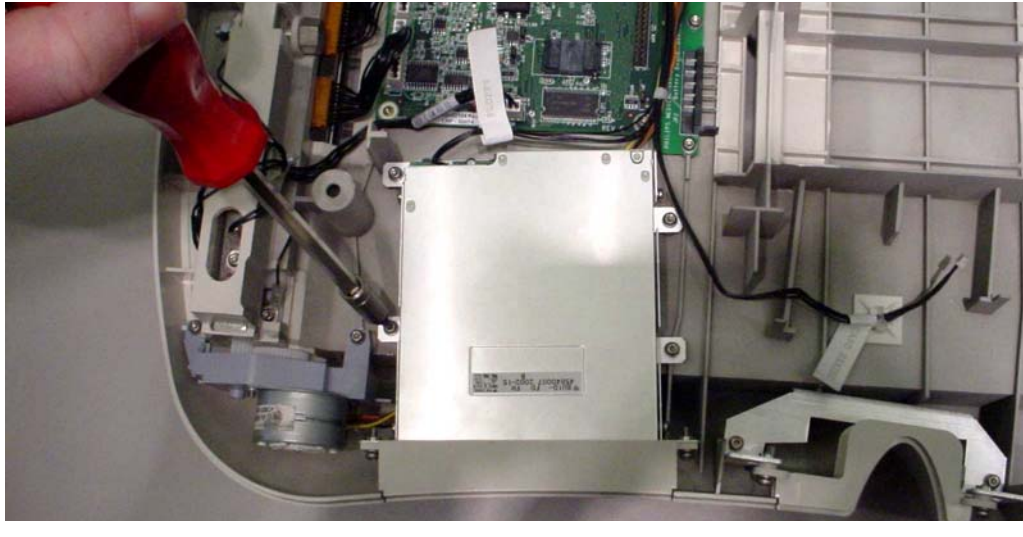
- 6 Close the lock.
- 7 Turn the top cover over, and attach the top cover. See page 6-8.
- 8 Insert the batteries. See page 6-3.
- 9 Plug the AC power cord into the power source.

Removing and Replacing the Floppy Disk Drive

Removing the Floppy Disk Drive

To remove the floppy disk drive

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-8.
- 4 Remove the four M3 x 6mm screws that secure the drive to the main housing.
- 5 Lift the drive slightly, and disconnect the four-pin connector.

Figure 6-34 Removing the Floppy Disk Drive

Replacing the Floppy Disk Drive

To replace the floppy disk drive

- 1 Connect the four-pin connector and insert the floppy disk drive.
- 2 Insert the four M3 x 6 mm screws that secures the floppy disk drive.
- 3 Attach the top cover. See page 6-8.
- 4 Insert the batteries. See page 6-3.
- 5 Plug the AC power cord into the power source.

Removing and Replacing the Printer Gearbox

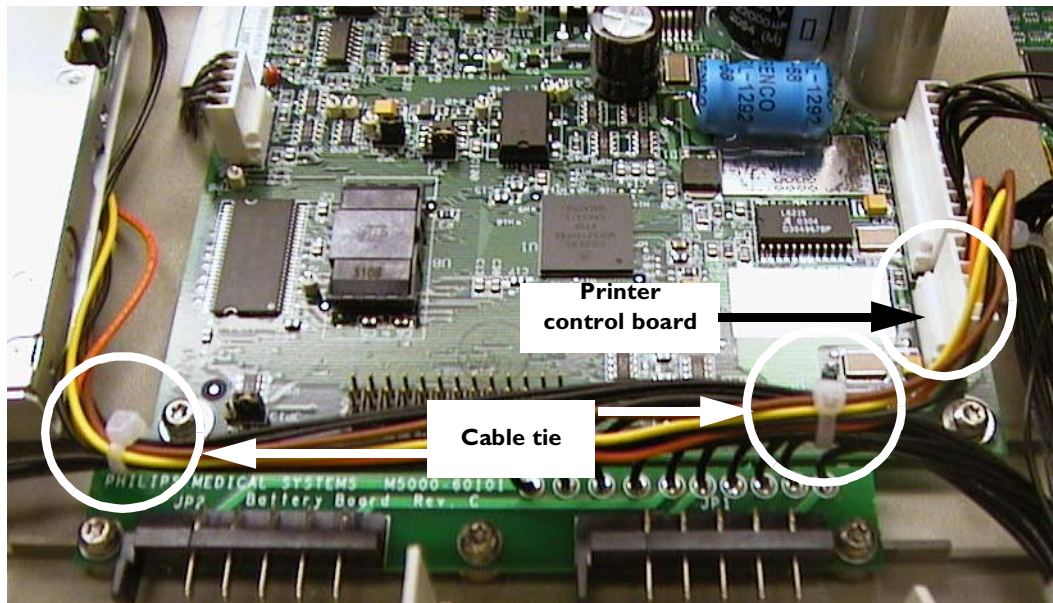
Removing the Printer Gearbox

To remove the printer gearbox

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-8.
- 4 Remove the floppy disk drive. See page 6-18.
- 5 Disconnect the printer motor connector at the printer control board.

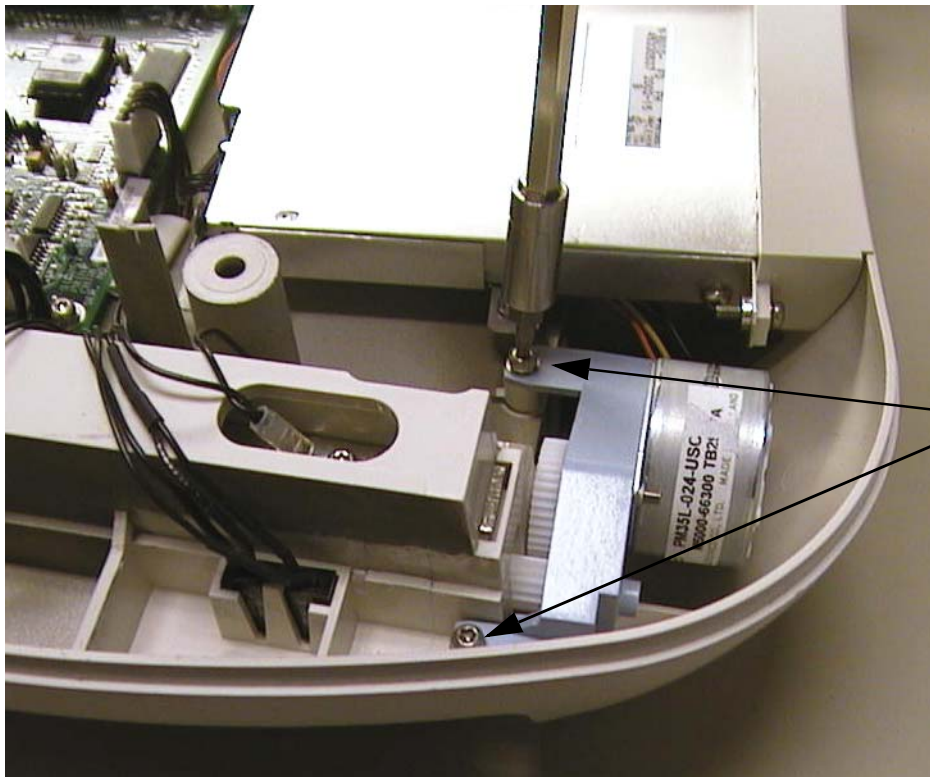
- 6 Cut the two cable ties. Do not damage the wires.

Figure 6-35 Cutting Cable Ties



- 7 Remove the two (2) M3 x 8mm screws that secure the printer gearbox to the main housing.

Figure 6-36 Removing Screws From the Printer Gearbox



- 8 Carefully lift the printer gearbox from the main housing.

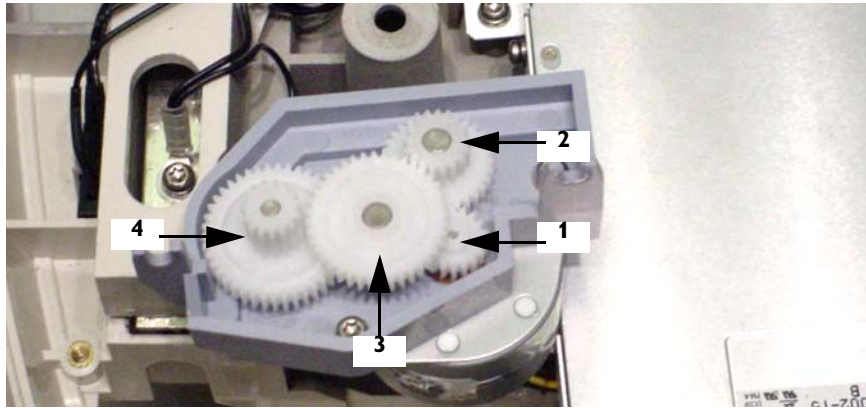
CAUTION Be sure not to tip the assembly, which will cause the individual gears to fall off the shafts.

Replacing the Printer Gearbox

To replace the printer gearbox

- 1 Install the gears, as shown.

Figure 6-37 Installing the Printer Gears

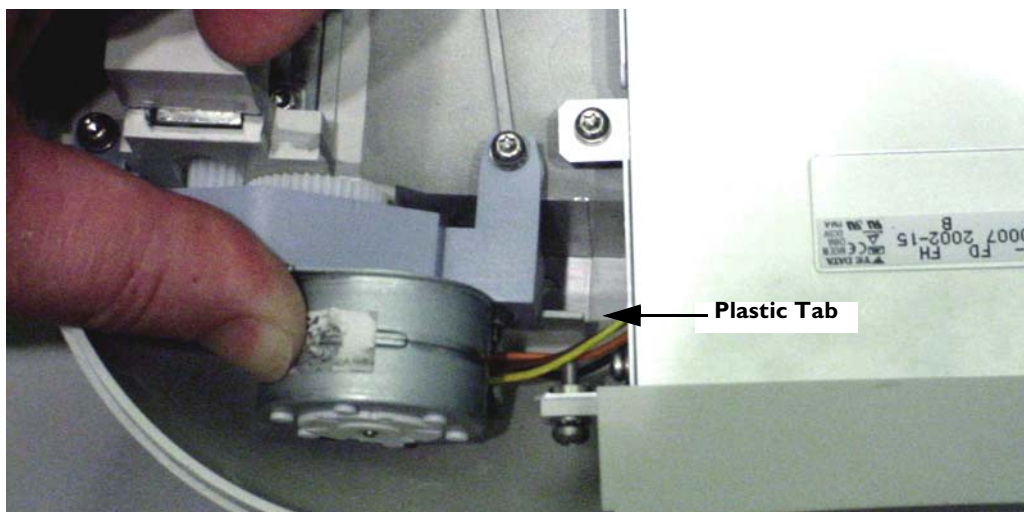


NOTE The gears are arranged on the shafts in the gear housing as shown. Each gear has a number molded into it.

- 2 Position the printer gearbox in the main housing.

NOTE When you tighten the printer gearbox screws, make sure to push the printer gearbox tight against the plastic tab in the main housing as shown.

Figure 6-38 Pushing Gearbox Against Tab



- 3 Attach the printer gearbox to the main housing with two (2) M3 x 8 mm screws. See Figure 6-36 on page 6-19.
- 4 Install the two tie wraps in the location, as shown in Figure 6-35 on page 6-19. Remove any excess.

Removing and Replacing the Print Head

Removing the Print Head Assembly

CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the print head assembly.

To remove the print head

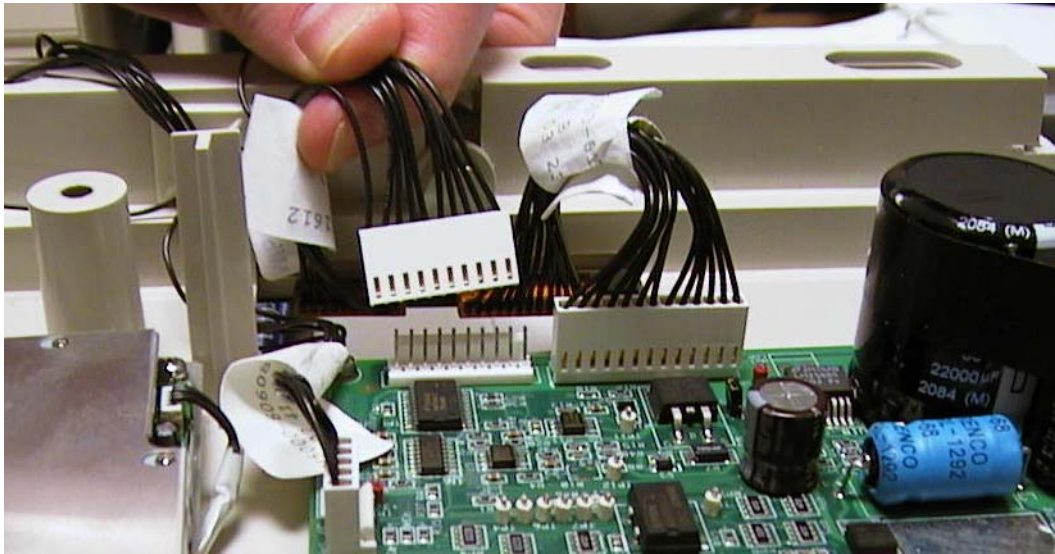
- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the paper tray. See page 6-8.
- 4 Remove the top cover. See page 6-8.
- 5 With the cardiograph upside down, remove the paper guide bar, as shown below.

Figure 6-39 Removing the Paper Guide Bar



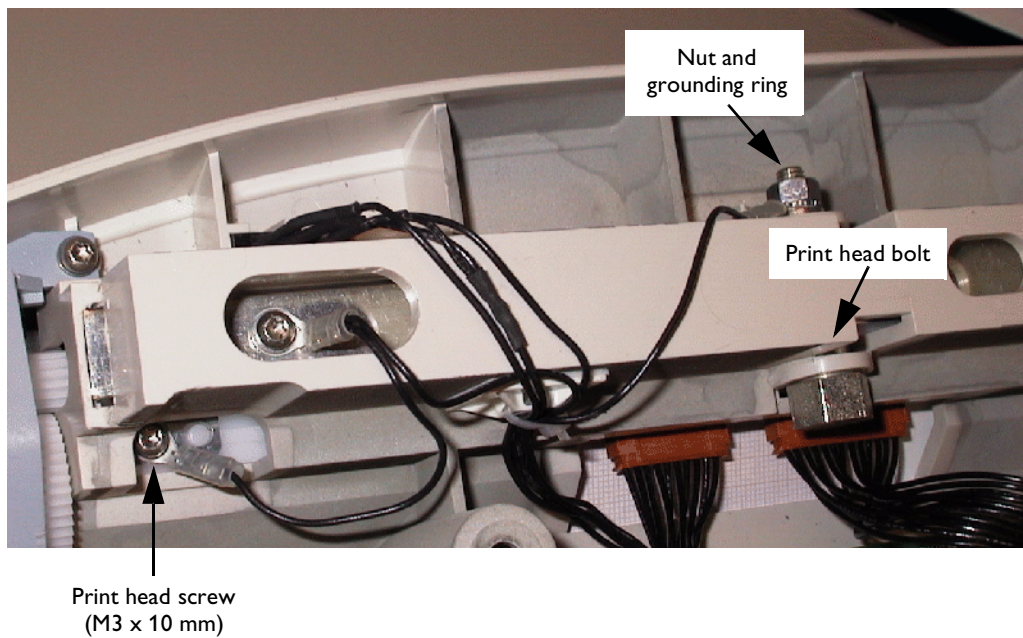
- 6 Turn over the instrument, and disconnect print head data and power ribbon connectors from the printer control board, as shown below.

Figure 6-40 Print Head Connectors on the Printer Control Board



- 7 Remove the M3 x 10 mm screw from the print head, shown below.

Figure 6-41 Print Head Components



- 8 Remove the nut and grounding ring from the print head bolt, as shown in Figures 6-41 and 6-42.

- 9 Remove the print head bolt by reaching under the print head well, and applying upward force on the actual print head while removing the bolt.

CAUTION

If you are reusing the print head, use gloves or other protective layer when pressing on the thermal surface. DO NOT touch with bare skin.

- 10 Carefully allow the print head assembly to drop down from the print head well.

Replacing the Print Head Assembly

CAUTIONS

Handle print head by the edges only or by the attached plastic holder. DO NOT touch the thermal element with bare fingers.

To replace the print head

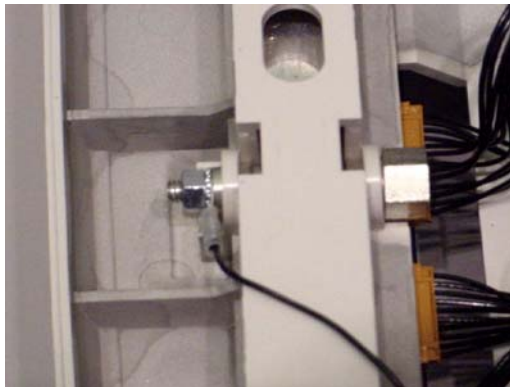
- 1 Insert print head assembly in print head well.
- 2 Pull the data and power ribbon cables through the slots.
- 3 Apply upward force to the print head, and insert the print head bolt, shown in Figures 6-41 and 6-42.

CAUTION

Use gloves or other protective layer when pressing on the thermal surface. DO NOT touch with bare skin.

- 4 Place the grounding ring terminal on the bolt, and tighten the nut.

Figure 6-42 Location of Grounding Ring Terminal on the Print Head Bolt



- 5 Insert the M3 x 10 mm screw into the print head, re-attaching the ground ring terminal, shown in Figure 6-41.
- 6 Connect the print head data and power cables to the printer control board, shown in Figure 6-41.

NOTE

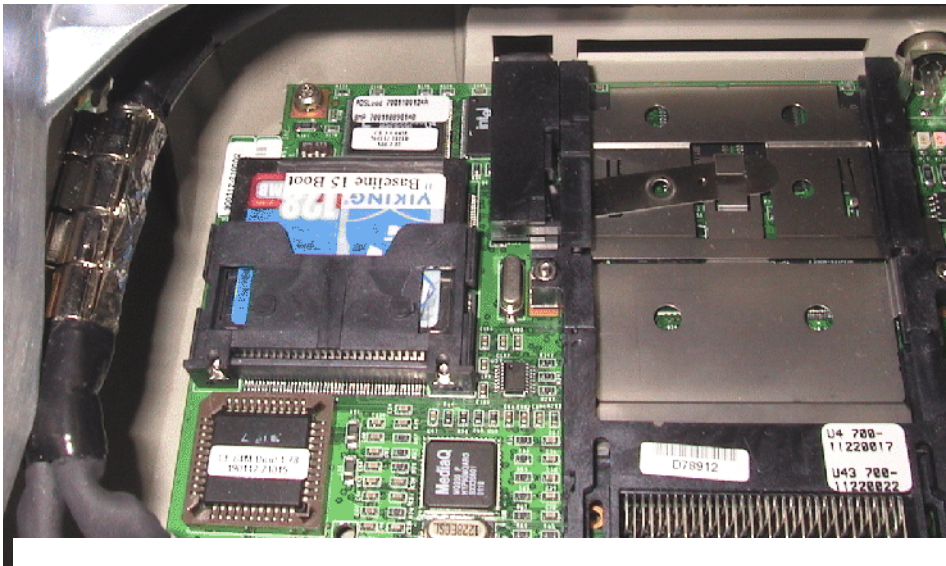
Make sure there is enough slack in the cables to give the print head full range of motion.

- 7 Install the paper guide bar. See page 6-21.
- 8 Insert the paper tray. See page 6-7.
- 9 Attach the top cover. See page 6-11.
- 10 Insert the batteries. See page 6-3.
- 11 Plug the AC power cord into the power source.

Removing and Replacing the Main Control Board

The main control board consists of the printed circuit assembly and the internal CompactFlash (CF) card. All of the custom configuration for the cardiograph and stored ECGs are contained on the main board's CompactFlash (CF) card.

Figure 6-43 CompactFlash (CF) Card



NOTE Retaining the CompactFlash (CF) card during a main board swap preserves this data. If the CompactFlash (CF) card is found to be defective, then it must be replaced, and the custom configuration and stored ECGs could be lost. Be sure to follow the instructions below for backing up the custom configuration and archived ECGs.

Removing the Main Control Board

CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the main control board.

To remove the main control board

- 1 Back up the cardiograph configuration to either a diskette or external CompactFlash (CF) card.

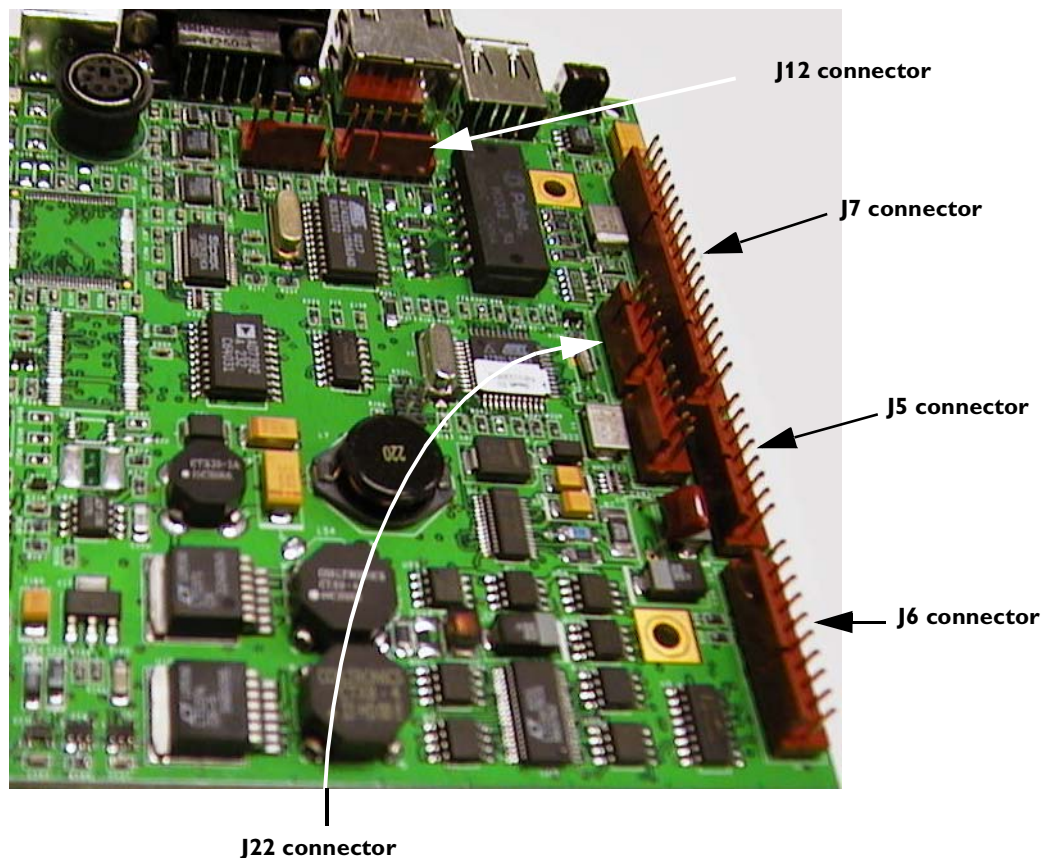
This can only be done if the cardiograph is operational. See the chapter, *Cardiograph Configuration*, of the *PageWriterTouch Instructions for Use*.

- 2 Transfer any archived EGGs to an external CompactFlash (CF) card, in case you need to restore them after replacing the main board.
This can only be done if the cardiograph is operational. See “Storing ECGs on Removable Media” in the Archive and Orders chapter of the *PageWriterTouch Instructions for Use*.
- 3 Unplug the AC power cord.
- 4 Remove the batteries. See page 6-3.
- 5 If a PC card is in the card slot in the back of the cardiograph, remove it by pressing the Eject button on the rear panel.
- 6 Remove any peripherals or cables attached to the rear panel of the cardiograph.
- 7 Remove the top cover. See page 6-8.

NOTE To minimize any flexing of the main control board, remove all cables prior to removing any of the screws.

- 8 Disconnect the J5, J6, J7, and J12 connectors.

Figure 6-44 Main Control Board, J5, J6, J7, J12, J22 Connectors



NOTE Connectors are not attached in this photograph.

- 9 Disconnect the J22 connector.
- 10 Remove the display cable from the bracket by carefully pulling it to the side. See Table 6-25

NOTE Pay close attention to the position of the J8 and J9 connectors. You will need to reattach them in the same manner when replacing the board. See Figure 6-28.

- 11 Disconnect the J8 and J9 connectors by pulling the display cable straight up. See Figure 6-28.
- 12 Remove the five screws that secure the main control board to the main chassis using a T10 Torx driver.

NOTE Pay close attention to the ground lug location under one of the screws. See Figure 6-50 on page 6-28.

- 13 Carefully lift the main control board up and out from under the display mounting bracket, as shown below.

Figure 6-45 Lifting Out the Main Control Board

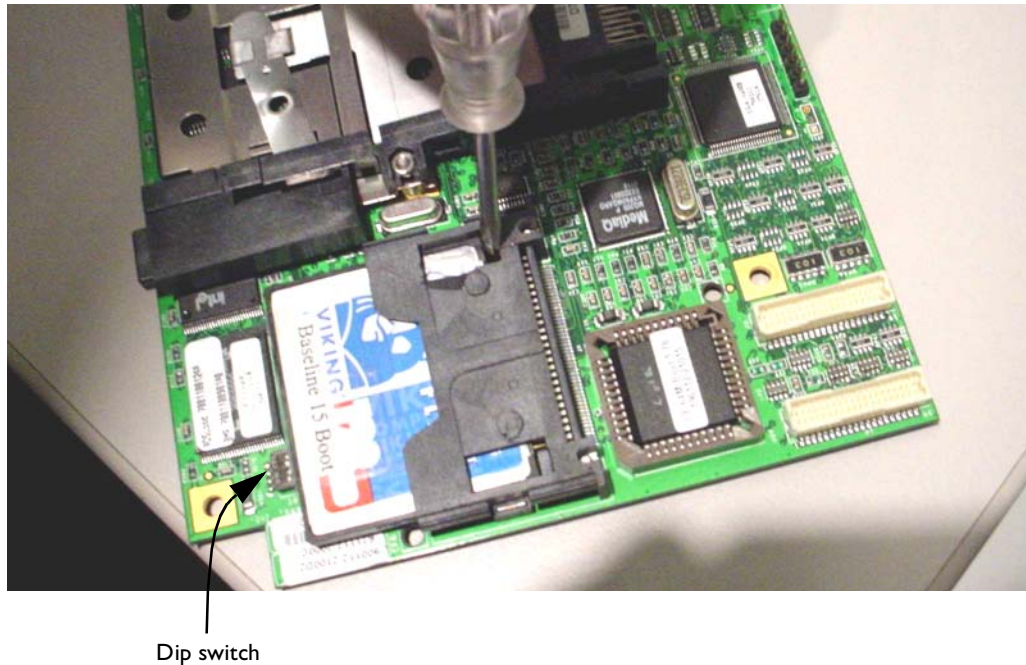


- 14 Using a small, straight-bladed screwdriver, carefully remove the CompactFlash (CF) card from the main control board by inserting the screwdriver at one corner, as shown.

CAUTION

Be careful not to damage the dip switch when you remove the CompactFlash (CF) card.

Figure 6-46 Removing the CompactFlash (CF) Card

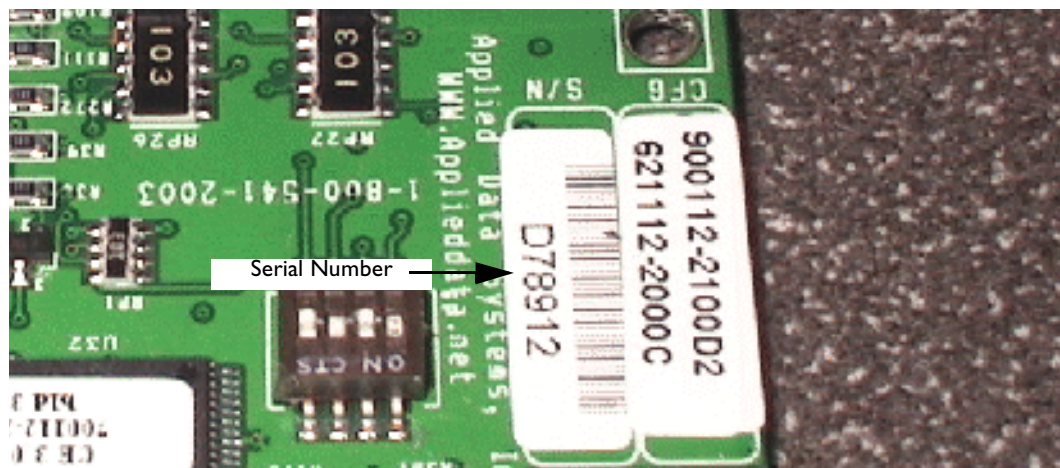


Replacing the Main Control Board

To replace the main control board

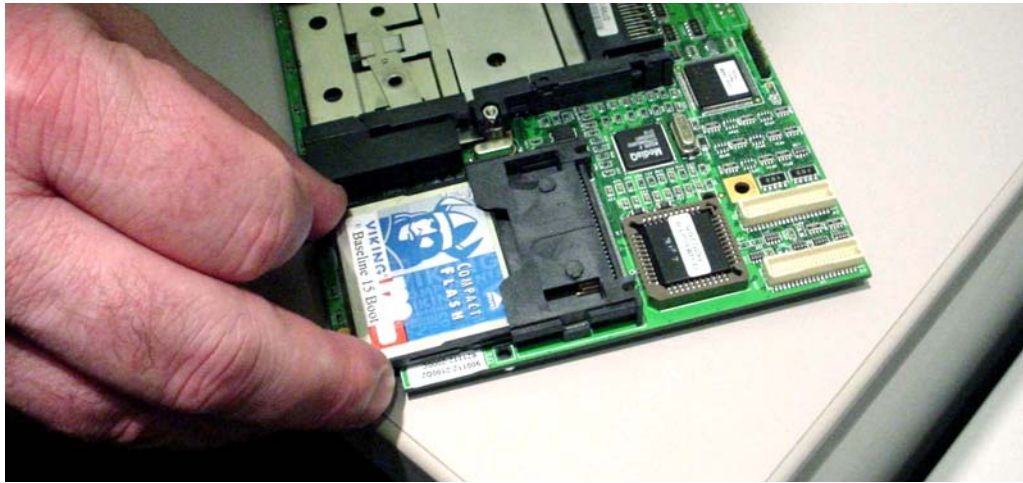
- 1 Record the serial number from the main control board on the service record. The serial number is located under the CompactFlash (CF) card.

Figure 6-47 Location of Serial Number on the Main Control Board



- 2 Insert a new or existing CompactFlash (CF) card into slot on the main control board, as shown below.

Figure 6-48 Inserting the CompactFlash (CF) Card



NOTE Make sure the DIP switches are set as follows:
1: ON 2: OFF 3: ON 4: OFF

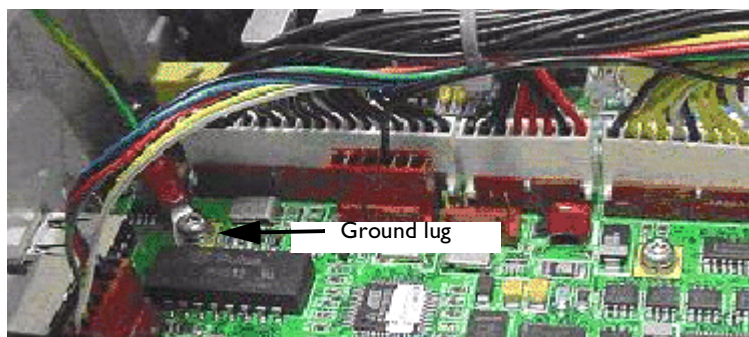
Figure 6-49 Dip Switches



- 3 Carefully replace the main control board.
- 4 Secure the main control board to the main housing, using a T10 Torx driver.

NOTE Pay close attention to the ground lug location under one screw, as shown.

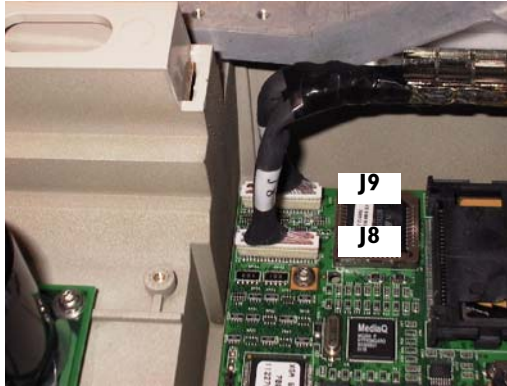
Figure 6-50 Location of Ground Lug



- 5 Replace the J8 and J9 connectors.

NOTE Make sure that the J8 and J9 connectors are oriented as shown.

Figure 6-51 Position of the J8 and J9 Connectors



- 6 Insert display cable into bracket. See Figure 6-29 on page 6-15.
- 7 Re-attach the J5, J6, J7, J12, and J22 connectors. See Figure 6-44 on page 6-25.
- 8 Re-attach keyboard connector. See page 6-12.
- 9 Replace the top cover. See page 6-11.
- 10 Re-insert the PC card, if one was present previously.
- 11 Reconnect any peripherals or cables that were attached to the rear panel.
- 12 Connect the PIM. See page 6-5.
- 13 Install the batteries. See page 6-3.
- 14 Plug the AC power cord into the power source.
- 15 After you replace the main board, reload the cardiograph software using the appropriate procedure outlined in Appendix B, “Software Installation Instructions.”

Removing and Replacing the Power Supply Assembly

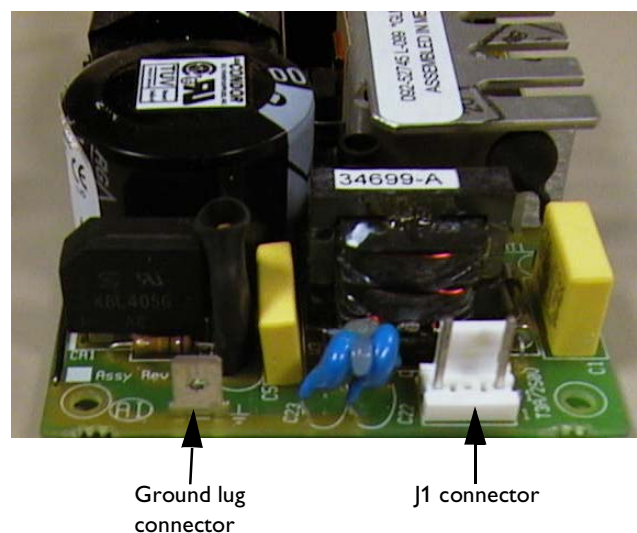
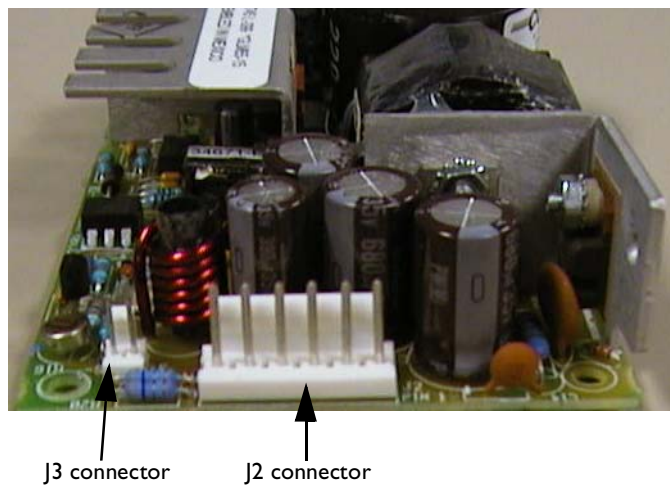
CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the power supply assembly.

Removing the Power Supply Assembly

To remove the power supply assembly

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-9.
- 4 Disconnect the J1, J2, J3 connectors by grasping the connector wires and pulling straight up.

Figure 6-52 Power Supply Assembly, J2, J3 Connectors



- 5 Remove the four (4) M3 x 6mm screws that secure the power supply to the bottom housing, using a Torx T10 driver.
- 6 Lift the power supply from the bottom housing.
- 7 Disconnect the ground spade lug connector from the power supply. See Figure 6-52 on page 6-30.

Replacing the Power Supply Assembly

To replace the power supply assembly

- 1 Be sure the insulator material is positioned under the power supply.
- 2 Connect the ground spade lug connector to the power supply. See Figure 6-52 on page 6-30.

TIP It is much easier to connect the ground spade lug connector before you insert the power supply.

- 3 Replace the power supply in the main housing.
- 4 Insert the four (4) M3 screws that secure the power supply to the main housing, using a Torx T10 driver.
- 5 Connect the J1, J2, J3 connectors. See Figure 6-52 on page 6-30.
- 6 Attach the top cover. See page 6-9.
- 7 Insert the batteries. See page 6-3.
- 8 Plug the AC power cord into the power source.

Removing and Replacing the Printer Control Board

CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the printer control board.

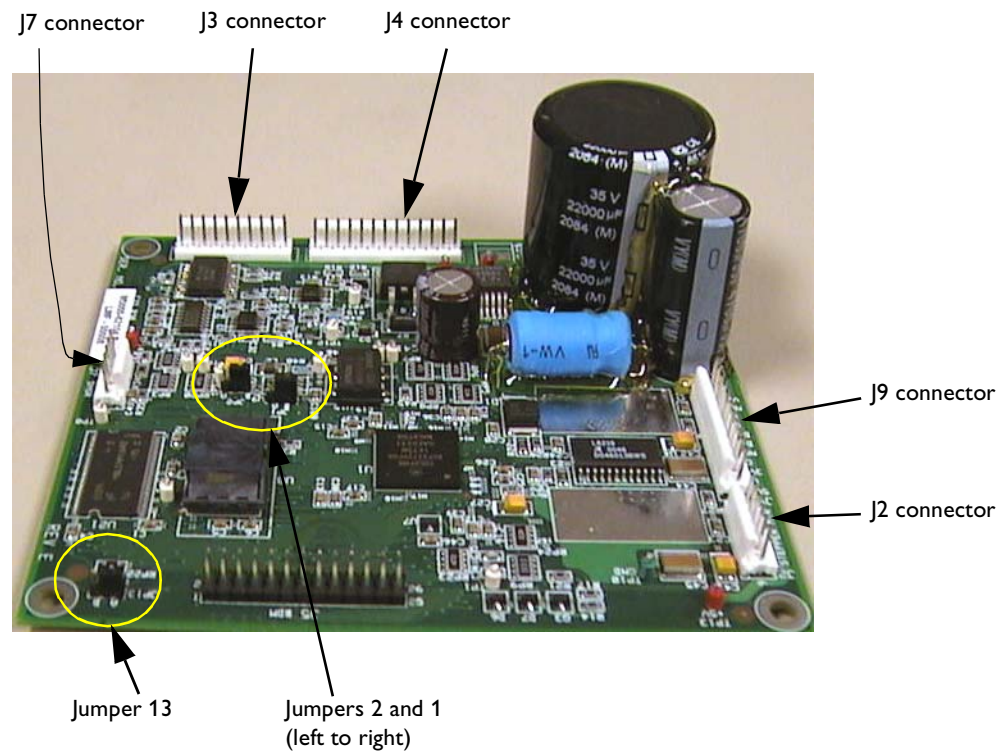
Removing the Printer Control Board

To remove the print control board

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-9.

- 4 Disconnect the J2, J3, J4, J7, and J9 connectors by grasping the connector wires and pulling straight up.

Figure 6-53 Printer Control Board, J2, J3, J4, J7, J9 Connectors and Jumpers



- 5 Remove the four (4) M3 x 6mm screws that secure the printer control board to the bottom housing, using a Torx T10 driver.
- 6 Lift the printer control board from the bottom housing.

Replacing the Printer Control Board

To replace the printer control board

- 1 Be sure the jumpers on the printer control board are set as follows (see Figure 6-53, above):
 - JP1: B
 - JP2: B
 - JP13: A
- 2 Replace the printer control board into the bottom housing.
- 3 Insert the four M3 x 6mm screws that secure the printer control board to the bottom housing, using a Torx T10 driver.
- 4 Re-attach the J2, J3, J4, J7, and J9 connectors. See Figure 6-53.

- 5 Replace the top cover. See page 6-9.
- 6 Insert the batteries. See page 6-3.
- 7 Plug the AC power cord into the power source.
- 8 After you replace the printer control board, load the printer control software from the internal CompactFlash (CF) card as described in Appendix B, "Software Installation Instructions" on page B-5.

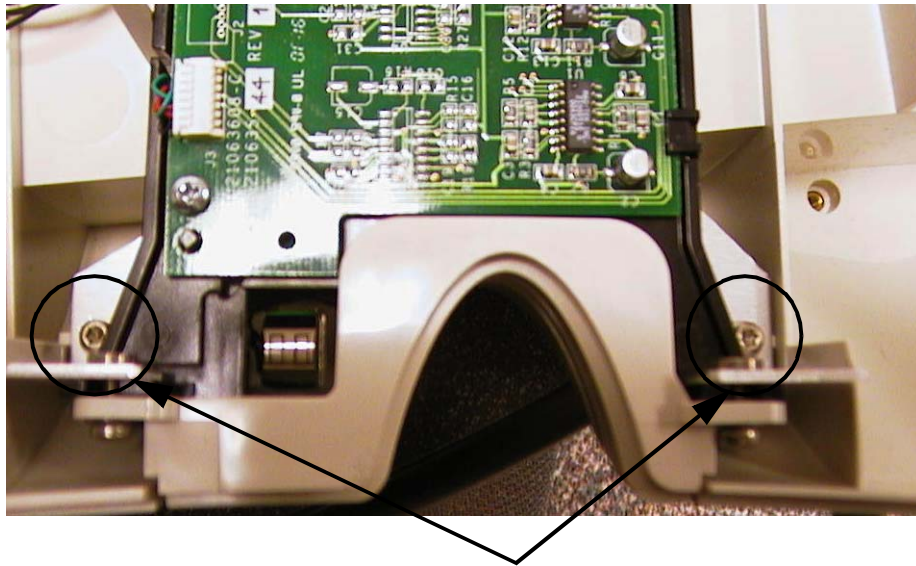
Removing and Replacing the Magnetic Card Reader

Removing the Magnetic Card Reader

To remove the magnetic card reader assembly

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-9.
- 4 Remove the two M3 x 6mm screws that secure the card reader to the bottom housing, using a Torx T10 driver.

Figure 6-54 Removing Magnetic Card Reader Screws



- 5 Slightly lift the card reader.
- 6 Disconnect the four-pin connector at the back of the assembly.

Replacing the Magnetic Card Reader

To replace the magnetic card reader assembly

- 1 Re-attach the four-pin connector.
- 2 Insert the two (2) M3 x 6mm screws that secure the card reader to the bottom housing, using a Torx T10 driver. See Figure 6-54 on page 6-33.
- 3 Replace the top cover. See page 6-9.
- 4 Insert the batteries. See page 6-3.
- 5 Plug the AC power cord into the power source.

Removing and Replacing the Main Cable Harness Assembly

Removing the Main Cable Harness Assembly

The main cable harness assembly consists of the following individual cables. If any of these cables fails, you must replace the entire harness assembly.

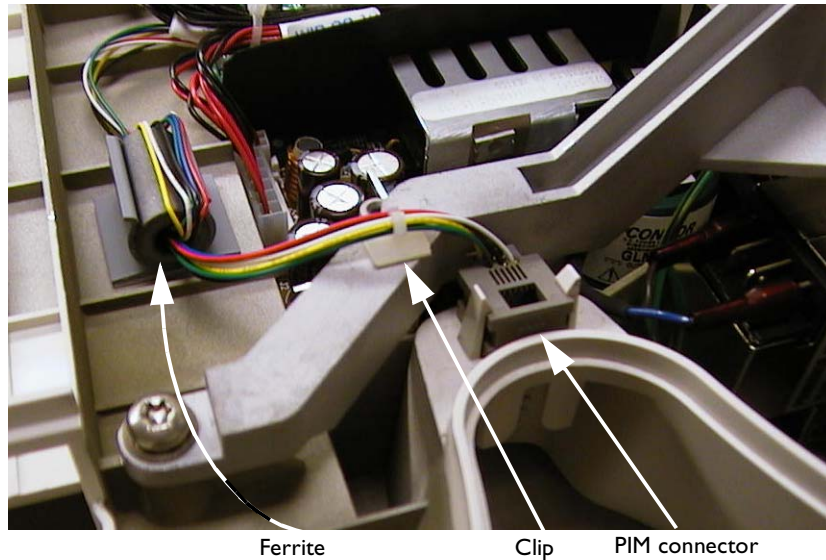
- Main cable harness (M5000-61600)
- DC power cable harness (M5000-61601)
- Patient data cable (M5000-61603)
- Battery interconnect (M5000-61604)

To remove the main cable harness assembly

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the PIM.
- 4 Remove the top cover. See page 6-9.
- 5 Remove the PIM connector from the bottom housing by carefully spreading the retainer clips, and pulling up.

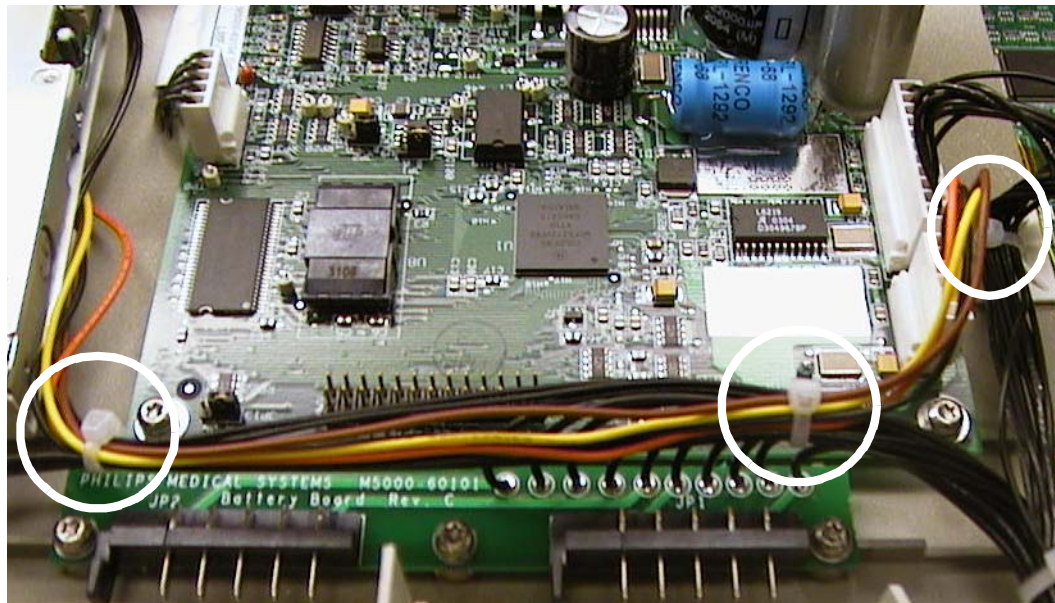
CAUTION Take care not to break the clips. Doing so will require replacement of the entire bottom housing.

Figure 6-55 PIM Connector, Ferrite, and Clip on Bottom Housing



- 6 Remove the ferrite from the clip.
- 7 Remove the J2 and J3 connectors from the power supply assembly by grasping the wires of each connector, and pulling straight up. See Figure 6-52 on page 6-30.
- 8 Remove J5, J6, J7, and J12 connectors from the main control board by grasping the wires of each connector, and pulling straight up. See Figure 6-44 on page 6-25.
- 9 Remove the J22 connector by grasping the connector directly, and pulling straight up. See Figure 6-44 on page 6-25.
- 10 Cut the cable ties at three locations, as shown. Do not damage the wires.

Figure 6-56 Cutting Cable Ties



- 11 Remove the J9 connector from the printer control board by grasping all the connector wires, and pulling straight up. See Figure 6-53 on page 6-32.
- 12 Remove the three M3 x6mm screws that secure the battery interconnect to the main housing, using a Torx T10 driver.
- 13 Disconnect the cable marked “floppy disk drive” from the floppy disk drive.
- 14 Disconnect the cable marked “magnetic card reader” from the magnetic card reader, if present.
- 15 Lift the main cable harness from the main housing.

Replacing the Main Cable Harness Assembly

To replace the main cable harness

- 1 Connect the cable marked “magnetic card reader” into the magnetic card reader, if present.
- 2 Connect the cable marked “floppy disk drive” into the floppy disk drive.
- 3 Insert the three M3 x 6mm screws to secure the battery interconnect to the bottom housing, using a Torx T10 driver.
- 4 Attach the J9 connector to the printer control board. See Figure 6-53 on page 6-32.
- 5 Attach cable ties at the three locations described in step 10 of the previous section, “Removing the Main Cable Harness Assembly.” Remove any excess.
- 6 Attach the J22 connector to the main control board. See Figure 6-44 on page 6-25.
- 7 Attach the J2 and J3 connectors to the power supply assembly. See Figure 6-52 on page 6-30.
- 8 Attach the J5, J6, J7, and J12 connectors to the main control board. See Figure 6-44 on page 6-25.
- 9 Insert the ferrite into the clip. See Figure 6-55 on page 6-35.
- 10 Routing the cable through the plastic clip, insert the PIM connector into the main housing and snap into place. See Figure 6-55 on page 6-35.

CAUTION Be sure the clip is positioned exactly as shown. Failure to do so may damage the patient data cable when you install the top cover.

- 11 Re-attach tie wraps. See Figure 6-56 on page 6-35.
- 12 Replace the top cover. See page 6-9.
- 13 Attach the PIM.
- 14 Insert the batteries. See page 6-3.
- 15 Plug the AC power cord into the power source.

Removing and Replacing the Top of Form Sensor Cable Harness

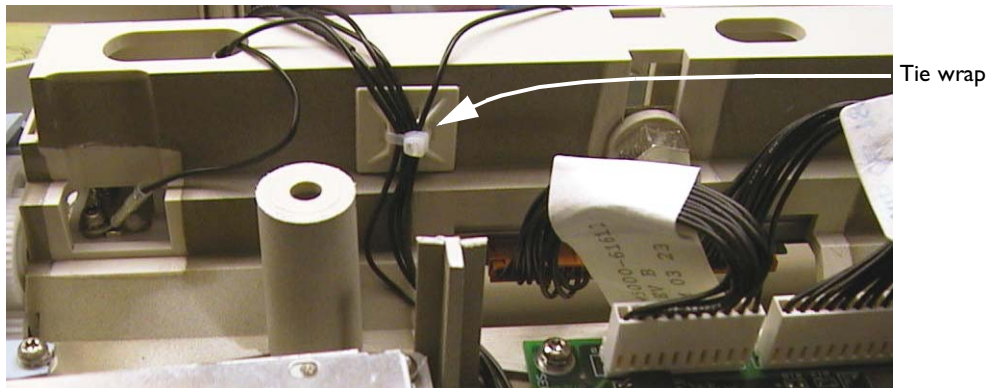
CAUTION Always wear an electrostatic wrist band or other approved method for protection against electrostatic discharge when disconnecting and handling the print head assembly.

Removing the Top of Form Sensor Cable Harness

To remove the top of form sensor cable harness

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the top cover. See page 6-9.
- 4 Remove the paper guide bar. See page 6-21
- 5 Remove the print head. See page 6-21.
- 6 Remove the J7 connector from the printer control board by grasping the connector wires, and pulling straight up. See Figure 6-53 on page 6-32.
- 7 Cut the tie wrap. Do not damage the wires.

Figure 6-57 Top of Form Sensor Tie Wrap



- 8 Carefully pry back the plastic tab, and pull the top of form sensor from the well.

CAUTION Take care not to break the clip. Doing so will require replacement of the entire bottom housing.

Figure 6-58 Top of Form Sensor



- 9 Remove the M3 screw, nut, and grounding lug from the leaf spring, as shown below, using a 5mm nut driver and T10 Torx driver.

Figure 6-59 Removing M3 Screw, Nut, and Ground Lug From Leaf Spring



- 10 Remove grounding ring terminals from print head bolt and M3x10mm print head screw. See Figure 6-31 on page 6-16.

Replacing the Top of Form Cable Harness

To replace the main cable harness

- 1 Under the cardiograph, attach the M3 screw, nut, and grounding lug to the leaf spring, using a nut driver and T10 Torx driver.
- 2 Attach grounding ring terminals to print head bolt and M3x10mm print head screw. See Figure 6-31 on page 6-16.
- 3 Snap the top of form sensor into place. See Figure 6-58.
- 4 Attach the tie wrap. Remove any excess. See Figure 6-57.

- 5 Attach the J7 connector to the printer control board. See Figure 6-53 on page 6-32.
- 6 Install the print head. See page 6-20.
- 7 Replace the top cover. See page 6-8.
- 8 Insert the batteries. See page 6-3.
- 9 Plug the AC power cord into the power source.

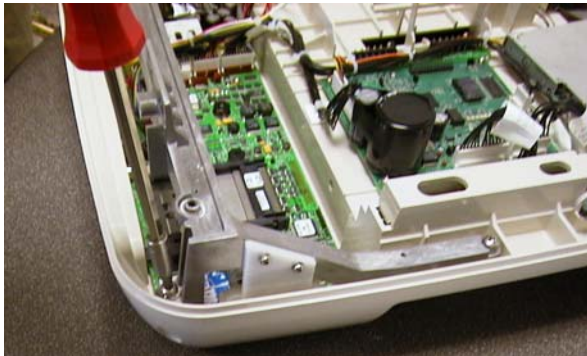
Removing and Replacing the Display Hinge Bracket

Removing the Display Hinge Bracket

To remove the display hinge bracket

- 1 Unplug the AC power cord.
- 2 Remove the batteries. See page 6-3.
- 3 Remove the rear cover. See page 6-9.
- 4 Remove the top cover. See page 6-9.
- 5 Remove the display and set aside. See page 6-10.
- 6 Unclip the patient data cable from the cable clamp. See Figure 6-55 on page 6-35.
- 7 Remove the four (4) M5 x 12mm screws that secure the display hinge bracket to the main housing, using a T25 Torx driver.

Figure 6-60 Detaching the Hinge Bracket From the Main Housing



- 8 Lift the display hinge bracket from the main housing.

- 9 Remove the display cable bracket from the hinge display bracket, using a T10 Torx driver.

Figure 6-61 Removing the Display Cable Bracket From the Hinge Bracket



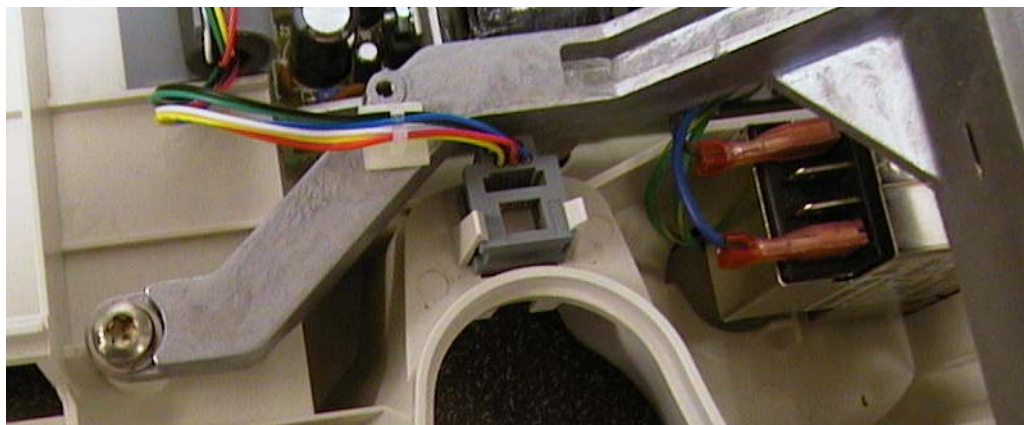
Replacing the Display Hinge Bracket

To replace the display hinge bracket

- 1 Attach the display cable bracket to the hinge display bracket, using a T10 Torx driver. See Figure 6-61.
- 2 Replace the display hinge bracket in the main housing.
- 3 Insert the four (4) M5 x 12mm screws to secure the display hinge bracket to the main housing, using a T25 Torx driver. See Figure 6-60.
- 4 Insert the patient data cable in the cable clamp on the hinge bracket.

CAUTION

Be sure the clip is positioned exactly as shown. Failure to do so may damage the patient data cable when you install the top cover.



- 5 Attach the display. See page 6-10.
- 6 Replace the top cover. See page 6-9.

- 7** Attach the rear cover. See page 6-9.
- 8** Insert the batteries. See page 6-3.
- 9** Plug the AC power cord into the power source.

Cardiograph Subassembly Views

This appendix shows illustrated, detailed views of each of the PageWriterTouch subassemblies, together with each element's part number to facilitate part ordering.

To order replacement parts, contact your local Philips Medical Systems Response Center, see "Contacting a Philips Response Center" on page 1-18.

This appendix provides the following information:

Main Assembly and Parts	A-1
Bottom Housing Assembly and Parts	A-4
Keyboard Assembly and Parts	A-6
Patient Interface Module (PIM) and Parts.	A-8
Print Head Assembly and Related Parts	A-10
Cart Assembly and Parts	A-12

Main Assembly and Parts

Figure A-1, "Main Assembly Exploded Diagram," on page A-2 illustrates each part of the main assembly.

Figure A-1 Main Assembly Exploded Diagram

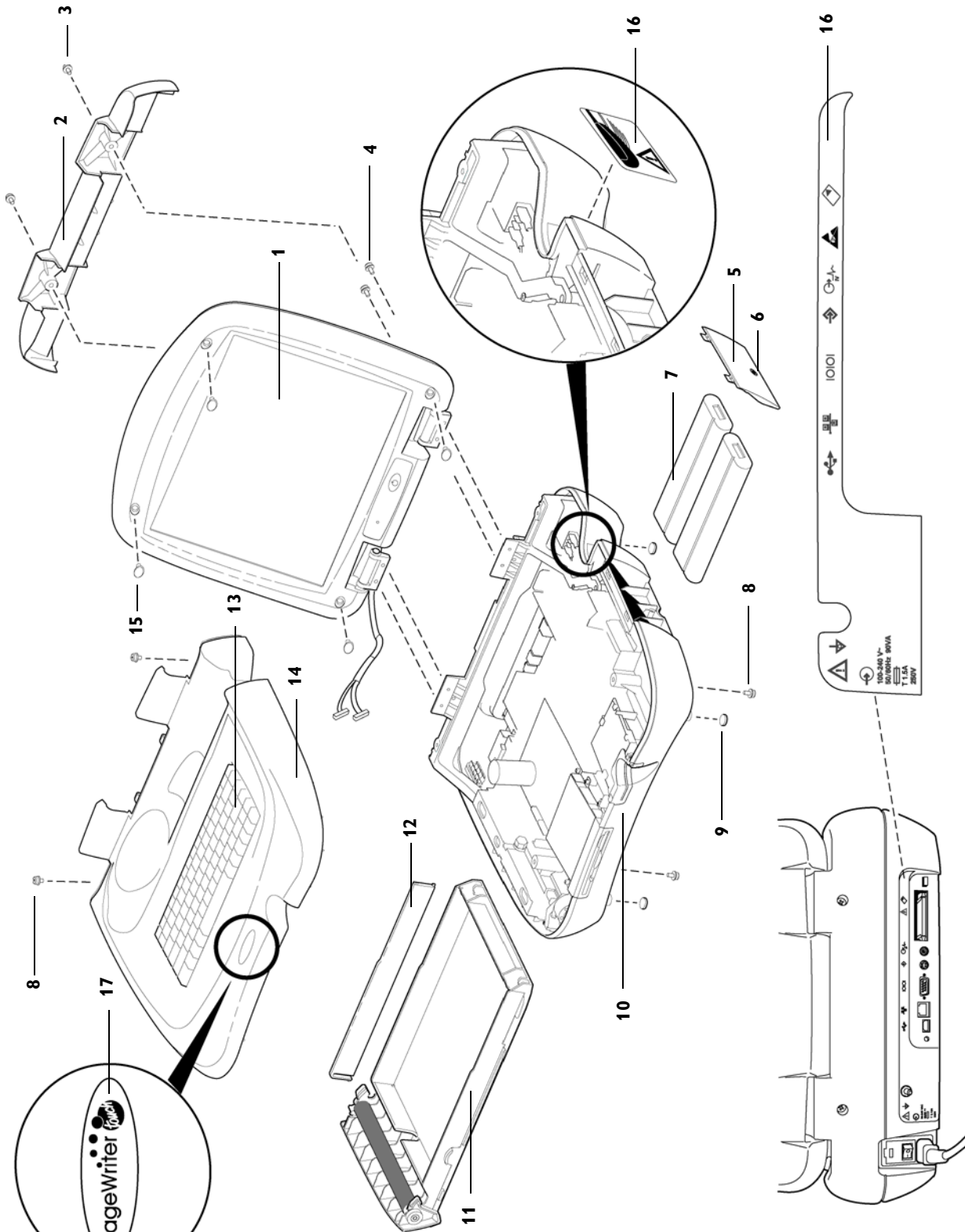


Table A-1 Main Assembly Parts List

Reference Number	Description	Part Number
1	Display assembly	453563479791
2	Rear cover	453563479351
3	Screw, M5 X 10 MM, nylon Phillips (2 required) Washer, rubber (2 required)	453563493621 453563493631
4	Screw, M4 X 9.5 MM (4 required)	453563488811
5	Battery door assembly (includes M3 x 8MM screw)	453563479131
6	Screw, M3 x 8mm Phillips	453563493611
7	Battery (2 required)	989803129131*
8	Screw M5 X 12 MM (4 required)	453563476341
9	Bumper (4 required)	453563465951
10	Bottom housing assembly	See Table A-2
11	Printer drawer assembly	453563479321
12	A4 paper shim	453563479331
13	Keyboard assembly	See Table A-3
14	Top housing	453563479391
15	Plug (4 required)	453563465941
16	Case Label set (includes both labels)	453563476441
17	PageWriterTouch label	453563466531

*. Supplies item must be ordered from Philips Medical Supplies. See “Supplies and Ordering Information” on page 1-14.

Bottom Housing Assembly and Parts

Figure A-2 Bottom Housing Assembly Exploded Diagram

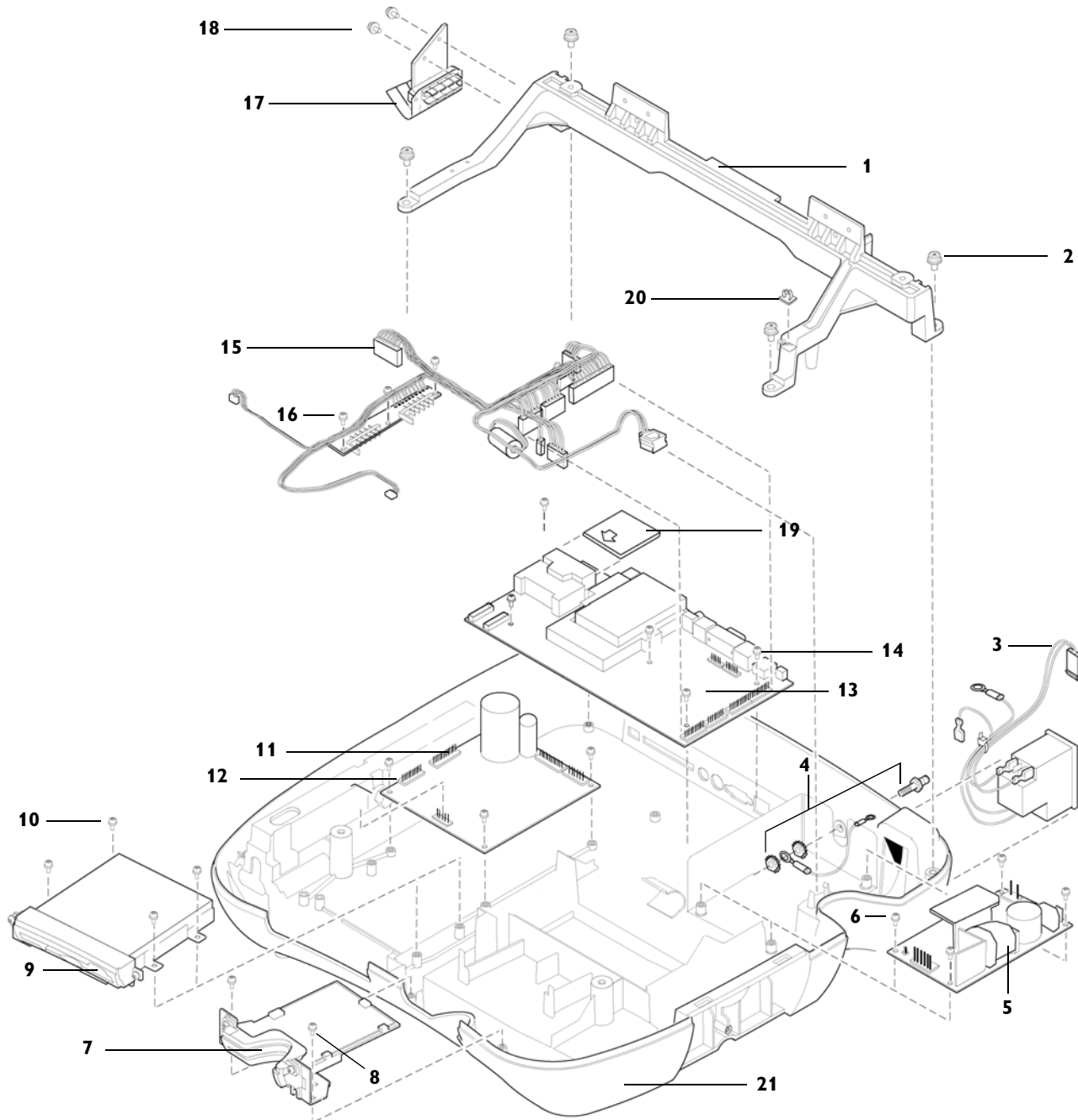


Table A-2 Bottom Housing Assembly Parts List

Reference Number	Description	Part Number
1	Hinge bracket	453563479801
2	Screw M5 X 12 MM (4 required)	453563476341
3	Power entry assembly This part includes 2 replacement AC fuses (part number 453563485231)	453563479211
4	Grounding stud (includes nuts, washers, and grounding wire)	453563479241
5	Power supply	453563479751
6	Screw M3 X 6 MM (4 required)	453563476321
7	Mag card reader assembly	989803127321
8	Screw M3 X 6 MM (2 required)	453563476321
9	Floppy drive assembly	453563479141
10	Screw M3 X 6 MM (4 required)	453563476321
11	Printer control board	453563479771
12	Screw M3 X 6 MM (4 required)	453563476321
13	Main control board	453563479731
14	Screw M3 X 6 MM (5 required)	453563476321
15	Main Cable Harness	453563479171
16	Screw M3 X 6 MM (3 required)	453563476321
17	Display cable bracket	453563487151
18	Screw M3 X 8 MM (2 required)	453563476331
19	CompactFlash (CF) card, blank	453563479161
20	Clip	453564001251
21	Bottom case (includes power entry assembly, leaf spring, top sensor assembly, labels, and all cable tie mounts)	453563479121

Keyboard Assembly and Parts

Figure A-3 Keyboard Assembly Exploded Diagram

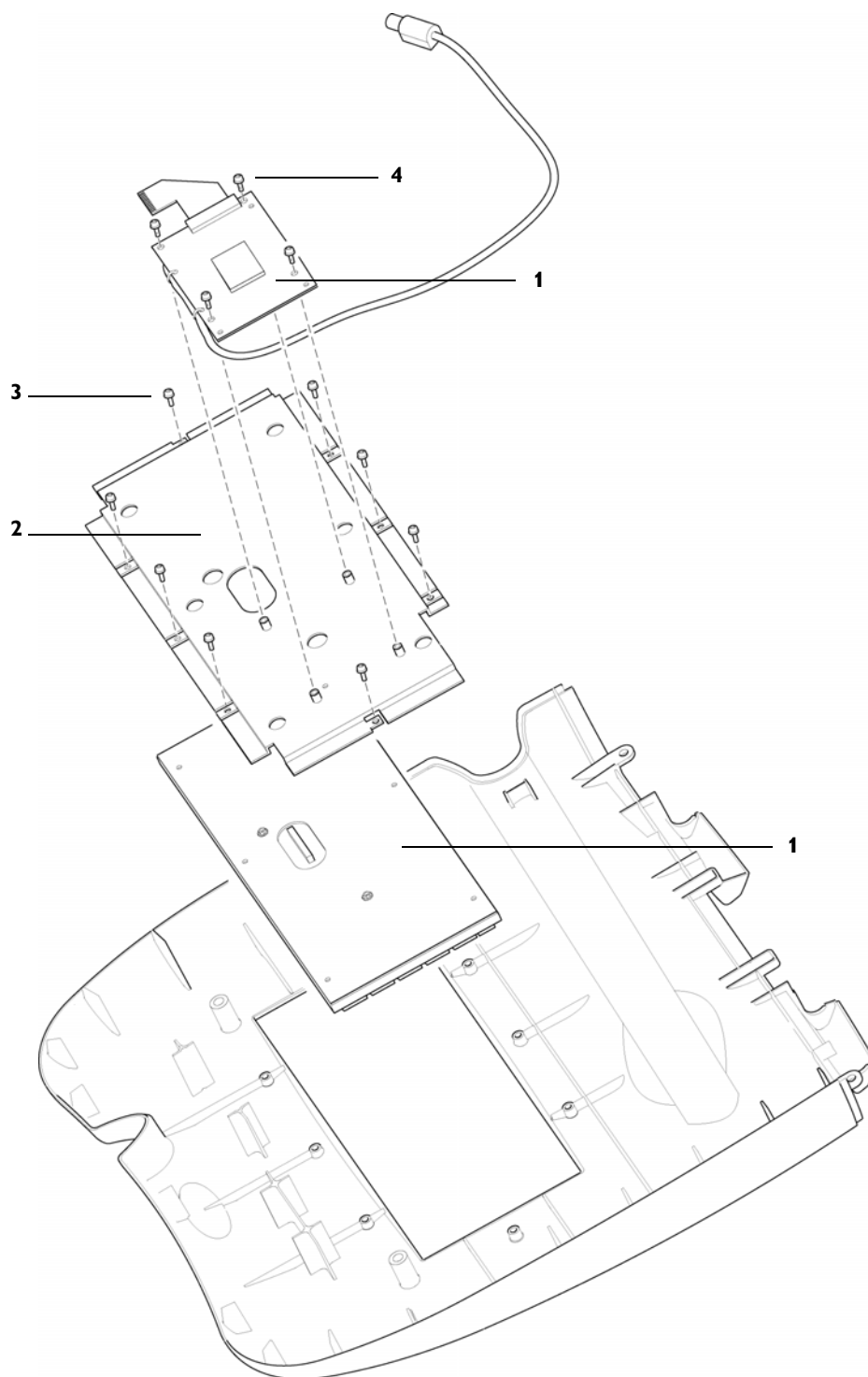


Table A-3 Keyboard Assembly Parts List

Reference Number	Description	Part Number
1	Keyboard (replacement includes interface card, flex circuit, and PS2 cable):	
	■ French	453563479471
	■ German	453563479461
	■ Italian	453563479501
	■ Japanese	453563479491
	■ Portuguese	453563479481
	■ Spanish	453563479451
	■ English (UK)	453563479441
	■ English (USA)	453563479431
2	Keyboard bracket	453563479401
3	Screw M3 X 6 MM (8 required)	453563476321
4	Screw M3 X 8 MM (4 required)	453563476331

Patient Interface Module (PIM) and Parts

Figure A-4 PIM Exploded Diagram

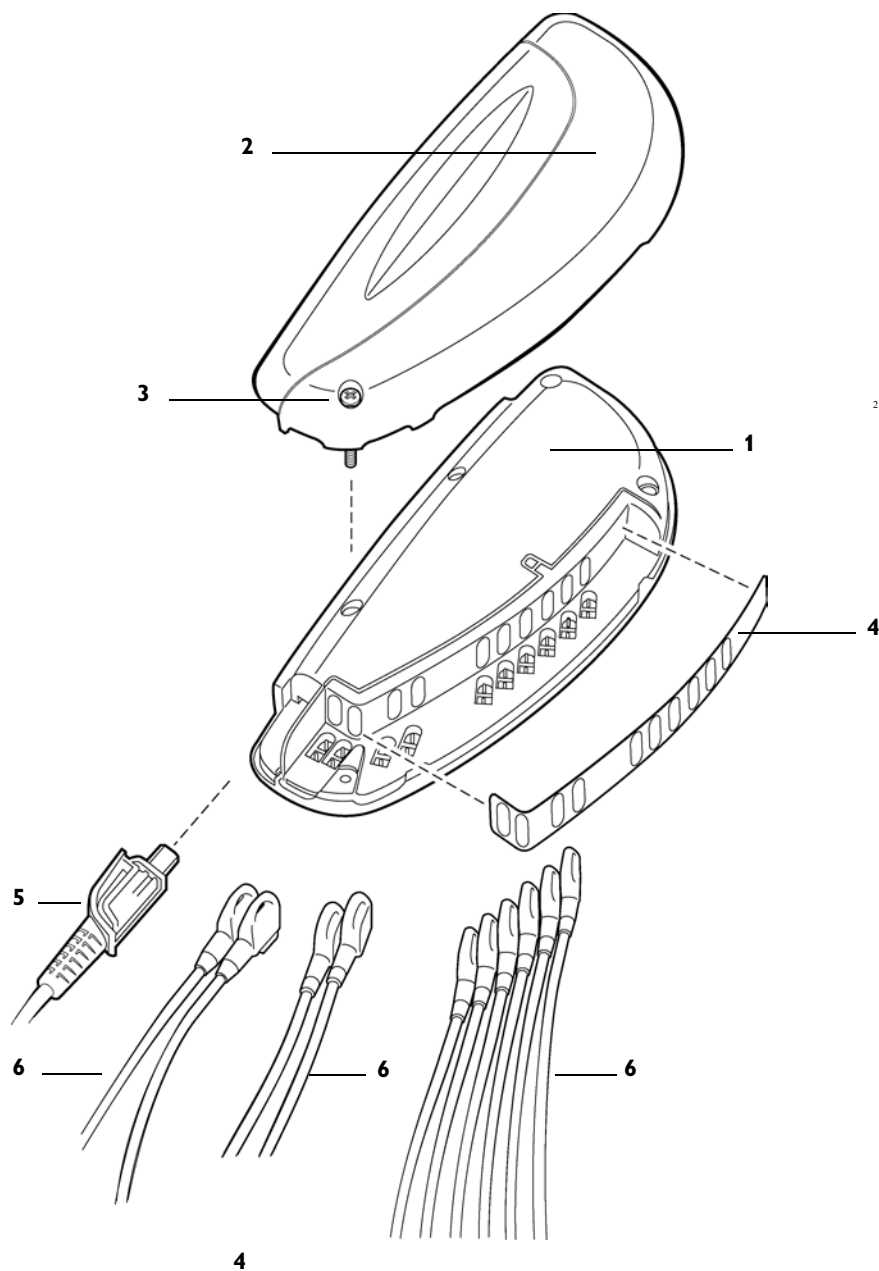


Table A-4 PIM Assembly Parts List

Reference Number	Description	Part Number
1	Patient Interface Module: <ul style="list-style-type: none"> ■ PIM AAMI ■ PIM IEC 	453563479821 453563479831
2	Cover, PIM w/ M3x22 screw	453563479841
3	Screw M3 x 22	453563485921
4	<ul style="list-style-type: none"> ■ Label - lead AAMI ■ Label - lead IEC 	453563490471 453563490481
5	USB patient data cable	989803129121*
6	Lead Sets: <ul style="list-style-type: none"> ■ Complete lead set, AAMI ■ Complete lead set, IEC ■ Long complete lead set, IEC ■ Limb lead set, AAMI ■ Chest lead set, AAMI ■ Limb lead set, IEC ■ Chest lead set, IEC ■ Long limb lead set, IEC ■ Long chest lead set, IEC 	989803129161* 989803129191* 989803129221* 989803129141* 989803129151* 989803129171* 989803129181* 989803129201* 989803129211*

* Supplies item must be ordered from Philips Medical Supplies. See "Supplies and Ordering Information" on page 1-14.

Print Head Assembly and Related Parts

Figure A-5 Print Head Assembly Exploded Diagram

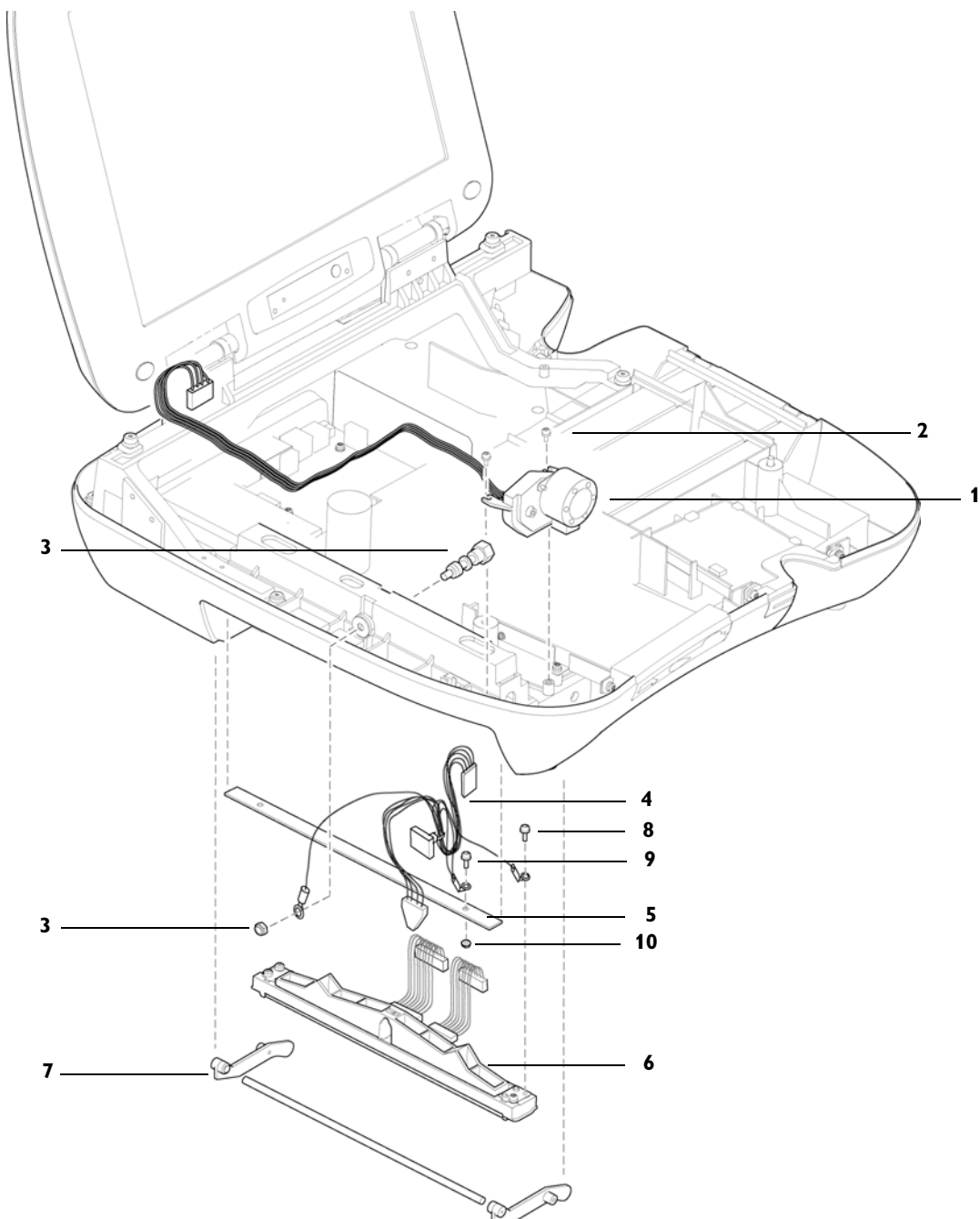


Table A-5 Print Head Assembly Parts List

Reference Number	Description	Part Number
1	Printer gearbox assembly	453563479341
2	Screw, M3 X 8 MM (2 required)	453563476331
3	Printhead bolt, nut	453563479281
4	Cable harness, top of form sensor	453563479251
5	Leaf spring	453563479261
6	Print head assembly (includes ribbon cables)	453563479311
7	Printer guide bar assembly	453563479301
8	Screw M3 X 10 MM	453564001261
9	Screw M3 X 6 MM	453563476321
10	M3 nut	453563476351

Cart Assembly and Parts

Figure A-6 Cart Assembly

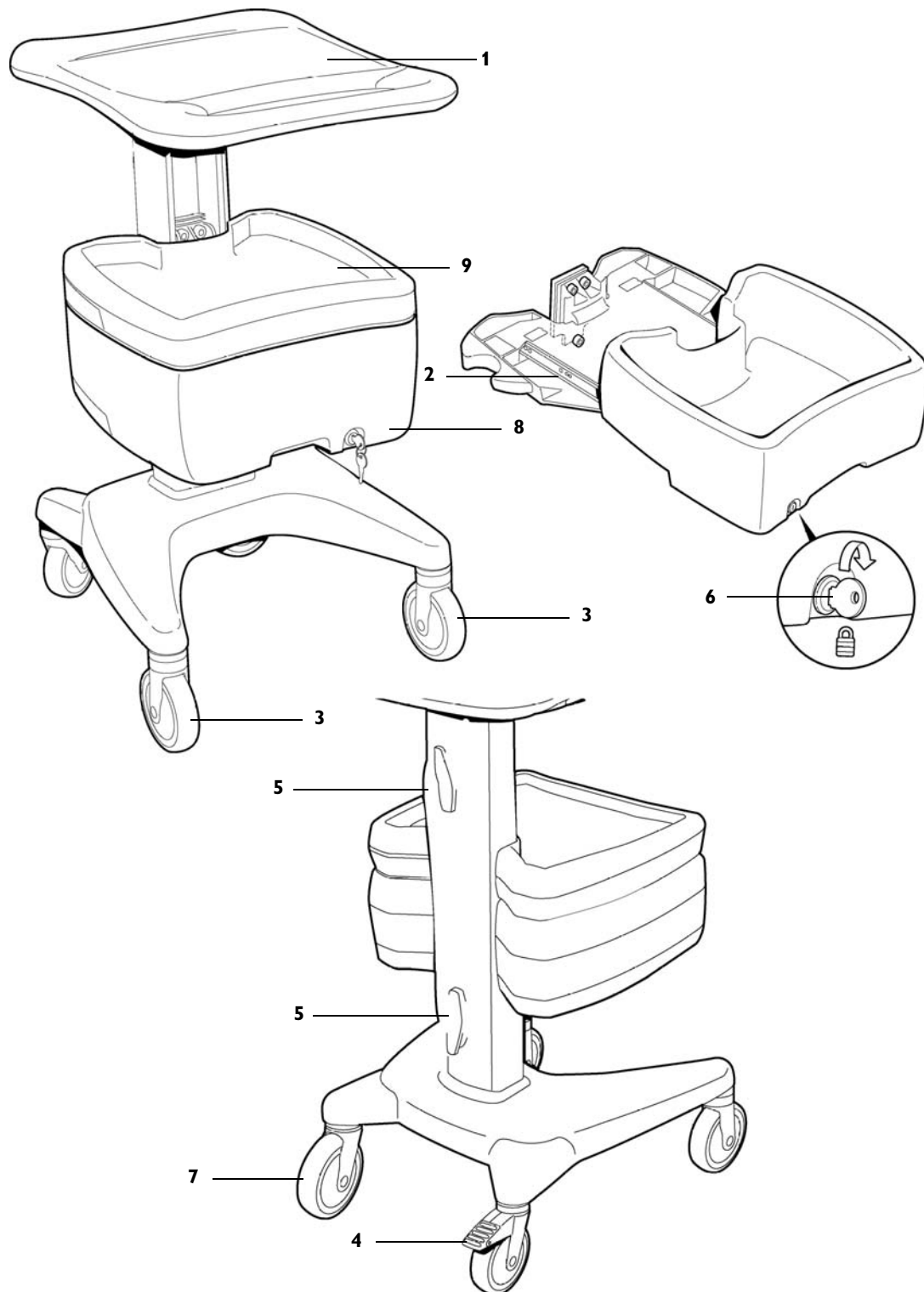


Table A-6 Cart Assembly Parts List

Reference Number	Description	Part Number
1	Cart top assembly	453563479651
2	Replacement drawer slide assembly (2 slides including hardware)	453563479661
3	Caster, front fixed (2 required)	453563479671
4	Caster, rear swivel locking (this location only)	453563479681
5	Cord retainer (includes hardware)	453563479691
6	Replacement lock and key	453563488071
7	Caster, rear swivel non-locking (this location only)	453563488421
8	Drawer	989803127441
9	Shelf	989803127451

Software Installation Instructions

This section covers the various means by which you install software on PageWriterTouch. The method used depends on the conditions you are facing at the time.

Before proceeding, you must understand how the PageWriterTouch cardiograph uses CompactFlash (CF) cards, as they are integral to the operation and maintenance of the unit. The cardiograph uses up to two CompactFlash (CF) cards, as follows:

- An internal CompactFlash (CF) card is attached to the main control board. This card is referred to as the *internal CompactFlash (CF) card*. This card contains the current system software required to run the cardiograph.
- An external CompactFlash (CF) card can be attached to an adapter and inserted into the PC card slot in the rear of the cardiograph. This card/adapter combination is referred to as the *PC card*. This card is used to transfer ECGs between devices, as well as to update the cardiograph system software.
- On-board memory flash contains the kernel (operating system). When you re-flash the system, you copy the kernel from the internal CompactFlash (CF) card to the on-board memory.

Figure B-1 Installing and upgrading PageWriterTouch software

To...	Use this procedure
Upgrade the software on a working unit	Standard Software Upgrade Procedure (page B-2)
Replace the main board and install a new internal CompactFlash (CF) card	Installing a New System (page B-4)
Replace the main board and transfer the internal CompactFlash (CF) card from the original board	Transferring an Existing System (page B-4)
Re-flash the cardiograph as directed, if the unit will not start	Transferring an Existing System (page B-4)

Standard Software Upgrade Procedure

Use this procedure when you are upgrading the software in an existing working unit. In this process, the system software is installed from an *Installation* PC card, which you must prepare in advance.

Preparing an *Installation* PC Card

To prepare an installation PC card, you must have a blank CompactFlash (CF) card with a minimum capacity of 128MB, a copy of the installation files for the PageWriterTouch cardiograph, and a PC card adapter. You must also have access to a laptop or other device that provides a CompactFlash (CF) card or PC card access.

To create an *Installation* PC card

- 1 Insert the CompactFlash (CF) card into the adaptor to form the PC card.
- 2 Insert the PC card into the card reader in a laptop or other device with an appropriate card reader.
- 3 Copy the PageWriterTouch A.01 files from the installation directory supplied by the factory to the top-level (root) directory of the PC card.

If the copy operation is successful, the top-level directory structure should appear as shown.

Figure B-2 Correct Directory Structure

Name	Size	Type
ENU		File Folder
Firmware_Images		File Folder
Startup		File Folder
PackingList.txt	10 KB	Text Document

- 4 Remove the PC card from the reader.
This PC card is referred to as the *Installation* PC card.

Installing Software Using the *Installation* PC Card

This section describes how to upgrade the PageWriterTouch cardiograph system software using the *Installation* PC card.

To install software using the *Installation* PC card

- 1 Insert the *Installation* PC card.
To create this card, see the previous section, “Preparing an Installation PC Card.”
- 2 Place the cardiograph in Standby mode.

NOTE Entering the Service Utility will require full reboot of cardiograph. Any unsaved patient data will be lost.

- 3 Perform a soft reset by pressing the **Reset** button adjacent to the USB connector on the rear panel of the cardiograph. See Figure 1-3, “Cardiograph Rear Panel,” on page 1-9.
After approximately 40 seconds, the PageWriterTouch Splash screen appears, followed by an audible beep.



- 4 Quickly, while the splash screen is displayed, hold down the left **CTRL** and **SHIFT** keys together and tap the touch screen.

NOTE The splash screen disappears after five seconds, so if you miss it, you must reset the cardiograph again.

An Access Code window appears. If the Access Code window does not appear, try the left **CTRL-SHIFT-touch** sequence again.

- 5 Type the access code.
The factory default code is “0000.” The Service Utility screen appears.
Wait for the status update to complete, and for the **Software Installation Utility** button to become enabled.
- 6 Touch **Software Installation Utility**.
After approximately 10 seconds, the Software Installation Utility screen appears.
- 7 Press the Space bar to select the language; for example, ENU for English.
- 8 Press **Tab** to access the Lead Set Type field, then press the Space bar to select the default; for example, AHA.
- 9 Press **Tab** to access the Install Operation field, then press the Space bar to select the default value, Full, All Components.

NOTE You must upgrade all software components. Do not select Partial Upgrade unless specific instructions to do so accompany the software upgrade.

- 10 Press **Tab** to access the Source field, then press the space bar to select the default value, PC Card.

- 11 Press *Tab*, then *Enter*, or touch **Start Installation** to begin the installation process.
If no errors occur, the installation continues through each upgrade point. The unit automatically resets to install the new kernel image. The total time for the final kernel upgrade process can take up to five (5) minutes to complete, during which time the unit will appear to be turned off. If the upgrade is successful, the unit restarts automatically and the calibration screen appears.

CAUTION Do not unplug the unit during this procedure.

- 12 Follow the standard setup steps to set the date and time and calibrate the touch screen.
For details, see “Setting the Date and Time” on page 3-13 and “Calibrating the Touch Screen” on page 3-12.

Installing a New System

Use this procedure when you replace the main control board complete with a new (blank) internal CompactFlash (CF) card. In this process, the system software is installed from an *Installation* PC card, which you must prepare in advance.

This procedure assumes that you have already replaced the main control board (see page 6-24) and it contains a blank internal CompactFlash (CF) card.

To install a new system

- 1 Follow the steps described in “Preparing an Installation PC Card” on page B-2.
- 2 With the unit off and batteries removed, insert the *Installation* PC card into the PC card slot in the rear of the unit. See Figure 1-3, “Cardiograph Rear Panel,” on page 1-9.
- 3 Turn the unit on.
The Service Utility screen appears. Wait for the status update to complete, and for the **Software Installation Utility** button to become enabled.
- 4 Follow steps 6 to 12 of “Installing Software Using the Installation PC Card” on page B-2.

Transferring an Existing System

Use these procedures when you replace the main control board and transfer the internal CompactFlash (CF) from the old board to the new board. You also use this procedure to re-flash the system.

This procedure assumes you have replaced the main control board (page 6-24), if necessary, and it contains an internal CompactFlash (CF) from a previously working unit.

Flashing the System from the Internal CompactFlash (CF) Card

To flash the system using the internal CompactFlash (CF) card

- 1 With the unit turned off and the batteries removed, set the main control board dip switches (page 6-28) to
1: OFF 2: OFF 3: ON 4: OFF
- 2 Plug the AC power cord into the power source, and turn on the unit.
This action automatically flashes the on-board CompactFlash (CF) from the contents of the internal CompactFlash (CF) card.
- 3 Monitor the progress of the flash process by observing the internal LED indicators on the main control board.
Initially, you will see one green and one red LED. During the actual flashing process, you will see one amber LED. Once the flashing is completed, you will see one green and one red LED again.

NOTE Do not unplug the unit during this process.

This process should take approximately five minutes. If it takes significantly more or less time, you will need to reload the internal CompactFlash (CF) card. See “Preparing a New Internal CompactFlash (CF) Card” on page B-7.

- 4 Once the flash process is complete, turn the unit off.
- 5 Restore the main control board dip switches to
1: ON 2: OFF 3: ON 4: OFF

The next step is to upgrade the Patient Interface Module (PIM) and printer software separately, using the Service Utility, as described next.

Installing Printer and PIM Software from the Internal CompactFlash (CF) Card

To install additional software from the internal CompactFlash (CF) card

- 1 Turn the unit on using AC power.
After approximately 40 seconds, the PageWriterTouch Splash screen appears, followed by an audible beep.



- 2 Quickly, while the splash screen is displayed, hold down the left **CTRL** and **SHIFT** keys together and tap the touch screen.

NOTE

The splash screen disappears after five seconds, so if you miss it, you must reset the cardiograph again.

An Access Code window appears. If the Access Code window does not appear, try the left **CTRL-SHIFT-touch** sequence again.

- 3 Type the access code.
The factory default code is “0000.” The Service Utility screen appears. Wait for the status update to complete, and for the **Software Installation Utility** button to become enabled.
- 4 Touch **Software Installation Utility**.
After approximately 10 seconds, the Software Installation Utility screen appears.
- 5 Press the Space bar to select the language; for example, ENU for English.
- 6 Press **Tab** to access the Lead Set Type field, then press the Space bar to select the default; for example, AHA.
- 7 Press **Tab** to access the Install Operation field.
Then:
 - a Press the Space bar to select the default value, Full, All Components.
 - b Press the down arrow to select PIM.
- 8 Press **Tab** to access the Source field.
Then:
 - a Press the Space bar to select the default, PC Card.
 - b Press the down arrow to select Internal CF Card.
- 9 Press **Tab**, then **Enter**, or touch **Start Installation** to begin the PIM software installation process.
The PIM software is installed. Touch **OK** when done.
- 10 Touch the Install Operation field and select Printer Controller from the list.
- 11 Touch **Start Installation** to begin the printer software installation process.
The Printer Controller software is installed. Touch **OK** when done.
- 12 Touch **Quit**, then **Restart Unit**.
The unit restarts automatically; the calibration screen appears.
- 13 Follow the standard setup steps to set the date and time and calibrate the touch screen.
For details, see “Setting the Date and Time” on page 3-13 and “Calibrating the Touch Screen” on page 3-12.

Preparing a New Internal CompactFlash (CF) Card

In the event that flashing the system from an installed internal CompactFlash (CF) card fails, you may need to reinstall the software on the card.

To prepare a new internal CompactFlash (CF) card

- 1 Unplug the AC power cord.
- 2 Shut down the power, and remove the batteries. See “Removing the Batteries” on page 6-2.
- 3 Remove the internal CompactFlash (CF) card from the slot on the main control board. See Figure 6-46, “Removing the CompactFlash (CF) Card,” on page 6-27.
- 4 Using a computer with an accessible card reader, delete the files on the card.
- 5 Copy the following files from the installation directory supplied by the factory to the top-level (root) directory of the CompactFlash (CF) card:
 - The contents of the ENU directory
Copy only the contents, not the actual folder.
 - PackingList.txt file
 - Firmware_Images directory
Copy the entire directory as a complete folder.
- 6 Find the file named nkload_enu.bin in the root directory and rename it nkload.bin.

Figure B-3 Final File Structure

Name	Size	Type	Modified
Firmware_Images		File Folder	1/8/2004 1:17 PM
Sierra		File Folder	1/8/2004 1:17 PM
SierraArchiveInte...		File Folder	1/8/2004 1:17 PM
SierraHelp		File Folder	1/8/2004 1:17 PM
SierraTemplate		File Folder	1/8/2004 1:17 PM
ADSLoad.exe	24 KB	Application	10/16/2003 11:45 AM
adsload.hwt	4 KB	HWT File	9/24/2003 2:14 PM
adsload.reg	12 KB	Registration Entries	9/24/2003 2:14 PM
adsload.reg.IEC	12 KB	IEC File	9/24/2003 2:14 PM
KRNCRC32.dat	1 KB	DAT File	10/16/2003 11:46 AM
nkload.bin	11,356 KB	BIN File	9/22/2003 3:16 PM
PackingList.txt	10 KB	Text Document	10/16/2003 11:46 AM
SA_ECG_NSR.raw	2,612 KB	RAW File	10/16/2003 11:24 AM
SABrowser.exe	41 KB	Application	10/16/2003 11:43 AM
SALauncher.exe	788 KB	Application	10/16/2003 11:46 AM
SALauncher.lst	1 KB	LST File	10/16/2003 11:46 AM
SALocalize.dll	70 KB	Application Extension	10/16/2003 11:37 AM
SAWatcher.exe	192 KB	Application	10/16/2003 11:46 AM

- 7 Insert the CompactFlash (CF) card into the internal CompactFlash (CF) slot on the main control board.
- 8 Perform the steps described in “Flashing the System from the Internal CompactFlash (CF) Card” on page B-5.

Acronyms and Common Terms

C

CompactFlash (CF)

An industry standard form factor package for non-volatile flash memory storage. Typically used in commercial digital cameras and similar equipment.

E

XML (Extensible Markup Language)

Common data representation XML syntax based on schema defined data collections.

G

GUI (Graphical User Interface)

Windows-based user interface.

P

PC Card

Formerly known as PCMCIA. An industry-standard form factor package for multi-function cards used with laptops and other devices.

PC Card Adaptor

An adaptor that converts a CompactFlash (CF) format card into a PCMCIA slot compatible form factor.

PWT (PageWriterTouch)

The Philips cardiograph number 860284.

PIM (Patient Information Module)

The USB connected sub-device that connects to the patient with electrodes, allowing the acquisition of ECG waveform signal.

S **Sierra**

The working project name for the PageWriterTouch (PWT) development effort. The Application and selection software components incorporate this name in their non-user visible executables and files.

U **USB (Universal Serial Port)**

Commercially available high-speed serial communications hardware and software standard. Provides communications and power sourcing for connected devices. Follows Hub & Device architecture.



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